

1 UNITED STATES DISTRICT COURT
2 FOR THE NORTHERN DISTRICT OF OHIO
3 EASTERN DIVISION

4 IN RE: NATIONAL) MDL No. 2804
5 PRESCRIPTION OPIATE)
6 LITIGATION) Case No.
7) 1:17-MD-2804
8)
9 THIS DOCUMENT RELATES TO) Hon. Dan A.
10 ALL CASES) Polster
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Saturday, May 4, 2019

HIGHLY CONFIDENTIAL - SUBJECT TO FURTHER
CONFIDENTIALITY REVIEW

Videotaped Deposition of MEREDITH B.
ROSENTHAL, Ph.D., held at Robins Kaplan LLP,
800 Boylston Street, Suite 2500, Boston,
Massachusetts, commencing at 8:04 a.m., on
the above date, before Michael E. Miller,
Fellow of the Academy of Professional
Reporters, Registered Diplomate Reporter,
Certified Realtime Reporter and Notary
Public.

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1 PROCEEDINGS

2 (May 4, 2019 at 8:04 a.m.)

3 THE VIDEOGRAPHER: We're now on
4 record. My name is Vince Rosica. I'm
5 a videographer for Golkow Litigation
6 Services. Today's date is May 4th,
7 2019 and the time is 8:04 a.m.

8 This video deposition is being
9 held in Boston, Massachusetts in the
10 matter of National Prescription Opiate
11 Litigation, MDL No. 2804, for the
12 Northern District of Ohio, Eastern
13 Division Court. The deponent is
14 Meredith Rosenthal.

15 Counsel will be noted on the
16 stenographic record. The court
17 reporter is Mike Miller and will now
18 swear in the witness.

19 MEREDITH B. ROSENTHAL, Ph.D.,
20 having been duly sworn,
21 testified as follows:

22 EXAMINATION

23 BY MR. ROTH:

24 Q. Good morning, Professor
25 Rosenthal.

1 A. Good morning.

2 Q. My name is Martin Roth. We met
3 off the record. I'll be taking your
4 deposition here today.

5 Can you please state your full
6 name for the record?

7 A. Meredith Beaven Rosenthal.

8 Q. And do you understand you're
9 testifying under oath here today?

10 A. I do.

11 Q. And you've testified at
12 depositions and in court and before Congress
13 in the past?

14 A. I have.

15 Q. Approximately how many times
16 altogether have you testified?

17 A. Perhaps 30 or 35.

18 Q. There's nothing that would
19 prevent you from testifying truthfully here
20 today?

21 A. There is not.

22 Q. If I ask you a question and you
23 give me an answer, I'm going to assume you
24 understood my question.

25 Is that fair?

1 A. Yes.

2 Q. And if for some reason you
3 don't understand one of my questions, you'll
4 ask me for clarification?

5 A. Yes, I will.

6 Q. Okay. I'm going to start by
7 marking as Exhibit 1 to your deposition your
8 expert report, and I'm also going to
9 simultaneously give you Exhibit 2, which is
10 the errata sheet we received on Thursday
11 night.

12 (Whereupon, Deposition Exhibit
13 Rosenthal-1, 3/25/19 Expert Report,
14 was marked for identification.)

15 (Whereupon, Deposition Exhibit
16 Rosenthal-2, Errata to Expert Report,
17 was marked for identification.)

18 BY MR. ROTH:

19 Q. So first, if you could look at
20 Exhibit 1 and just confirm that that appears
21 to be your expert report in this case along
22 with Attachments A through D.

23 A. It is correct.

24 Q. And if you look at page 75, is
25 that your signature on the report?

1 A. Yes, it is.

2 Q. Exhibit 2 is a memo dated
3 May 2nd from Forrest McCluer at GMA to
4 yourself and Mr. Tom Sobol, your -- the
5 attorney sitting with you; is that correct?

6 A. That's correct.

7 Q. And GMA is Greylock McKinnon?

8 A. That's correct.

9 Q. And who is Mr. McCluer?

10 A. Mr. McCluer is a senior
11 economist there who worked with me on this
12 matter.

13 Q. And I take it, given that
14 Mr. McCluer went through the report to error
15 check, that you believe that your report,
16 along with the errata sheet, is accurate as
17 of today?

18 A. I do.

19 Q. You didn't see any other errors
20 that aren't contained in the errata?

21 A. I have not.

22 Q. And all of the opinions that
23 you plan to give at trial in this matter are
24 contained in your report as corrected by your
25 errata?

1 A. That's correct.

2 Q. Professor Rosenthal, you're a
3 healthcare economist; is that correct?

4 A. Yes, that's right.

5 Q. You're not a medical doctor?

6 A. I am not.

7 Q. You're not an expert in the
8 treatment of addiction?

9 A. I am not.

10 Q. You're not an expert in opioid
11 use disorder?

12 A. I am not.

13 Q. And I looked at your CV. I
14 don't think you've published on either
15 addiction or opioid use disorder; is that
16 correct?

17 A. I don't believe I have.

18 Q. You're not an expert in
19 pharmacology?

20 A. I am not.

21 Q. You're not an expert in
22 epidemiology?

23 A. I am not, although I do have
24 some knowledge of epidemiology.

25 Q. You've reviewed epidemiological

1 studies, but you're not an epidemiologist?

2 A. That's correct. An
3 epidemiology class was required for my Ph.D.,
4 so I took an epidemiology class. I operate
5 in the environment of public health research
6 where epidemiology is an important strand
7 that I frequently encounter, but I'm not an
8 epidemiologist.

9 Q. And you're not a toxicologist?

10 A. I am not a toxicologist.

11 Q. You're not a pain management
12 physician?

13 A. I am not.

14 Q. You don't diagnosis or treat
15 pain?

16 A. No, I do not.

17 Q. You're not an expert in the
18 FDA?

19 A. I am not an expert in the FDA,
20 although, again, as you know, my work has
21 frequently concerned FDA rules.

22 Q. But you've never worked for the
23 FDA?

24 A. I have not.

25 Q. And you've never consulted a

1 company regarding the meaning of FDA
2 regulations or regulatory requirements?

3 A. I have not.

4 Q. You do understand that
5 prescription opioids are FDA-approved
6 products?

7 A. Yes, I do.

8 Q. And, in fact, if you look at
9 your report, at paragraph 19, which is the
10 bottom of page 15. Let me know when you're
11 there.

12 A. Yes.

13 Q. You acknowledge that since 1962
14 the FDCA and related regulations have
15 required sponsors of new drug products to
16 present scientific evidence of both efficacy
17 and safety before a new product can be
18 marketed.

19 Do you see that?

20 A. Yes, I do.

21 Q. And you cite to the FDA website
22 when you write that?

23 A. That's right.

24 Q. And then turning the page, you
25 say in paragraph 20: By regulation,

1 prescription drug labels indicate the
2 diseases, conditions and/or patients for
3 which the sponsor has presented
4 scientifically required evidence to the FDA.

5 Right?

6 A. Yes, that's what it says.

7 Q. And for that proposition, you
8 cite to a number of federal regulations in
9 footnote 31?

10 A. I do.

11 Q. You're not an expert on drug
12 labeling.

13 A. I am not.

14 Q. In paragraph 21 of your report,
15 you say: FDA regulations specify that
16 promotional materials may only make claims
17 that are supported by scientific
18 evidence, i.e., supported by studies meeting
19 scientific standards, and they may not be
20 false or misleading.

21 Did I read that correctly?

22 A. You did.

23 Q. And you're not an expert on FDA
24 regulations, are you?

25 A. I am not.

1 Q. And then in paragraph 22 you
2 say: FDA oversight of drug promotion is
3 intended to ensure that physicians and
4 consumers understand both the benefits and
5 risks of a drug. FDA regulations call for
6 fair balance in all promotional claims and
7 materials. The risks as well as the benefits
8 must be clearly identified and risks must be
9 given appropriate prominence.

10 Do you see that?

11 A. Yes, I do.

12 Q. And there's another citation to
13 a Code of Federal Regulations section for
14 that paragraph, correct?

15 A. Yes.

16 Q. You understand that the FDA
17 regulates labeling for prescription drugs,
18 based on what you've said in your report?

19 A. I do.

20 Q. And the FDA approves
21 prescription drugs even if they have known
22 risks?

23 A. Yes.

24 Q. Do you understand that the FDA
25 also regulates promotional materials for

1 prescription drugs?

2 MR. SOBOL: Objection.

3 A. Yes, I do.

4 BY MR. ROTH:

5 Q. And the FDA has authority to
6 police advertising that it believes would
7 result in prescription drugs being misbranded
8 under the federal regulations?

9 MR. SOBOL: Objection.

10 A. I'm not sure exactly what you
11 mean by "police," but as I've described in my
12 report, I understand that materials are
13 reviewed by the FDA.

14 BY MR. ROTH:

15 Q. And the FDA has the authority
16 to tell a drug manufacturer to either modify
17 or refrain from using materials that it may
18 review?

19 A. I just want to be careful that
20 I don't try to convey any legal expertise
21 here, but I am aware that the FDA, for
22 example, issues warning letters pertaining to
23 specific marketing tactics and messages. If
24 that's what you're referring to then, yes, I
25 understand that.

1 Q. Well, more than warning
2 letters, the FDA may tell a manufacturer when
3 it reviews draft promotional materials, for
4 example, that it does not approve their
5 dissemination.

6 Are you aware of that?

7 MR. SOBOL: Objection, asked
8 and answered.

9 A. I guess I would have thought of
10 that as similar -- again, not being a legal
11 expert -- similar to those warning letters
12 that say that you may not do this. The
13 specifics of how the enforcement flows after
14 that, what the FDA can and can't do in terms
15 of enforcement, I'm a little less clear on.

16 BY MR. ROTH:

17 Q. Okay. And I appreciate that
18 you're not a legal expert, but do you
19 understand that in addition to issuing
20 warning letters after materials may have gone
21 out, the FDA, sometimes before materials are
22 utilized, may give input and feedback to
23 manufacturers about the materials that they
24 plan to use?

25 A. Yes, I believe that's true.

1 Q. And you did not study which, if
2 any, of the promotional materials for
3 prescription opioids were submitted to FDA
4 for its review before they were used?

5 MR. SOBOL: Objection.

6 A. I did not study that, no.

7 BY MR. ROTH:

8 Q. And you did not study which of
9 the detailing contacts in your regression
10 models, which we'll talk about, involve
11 promotional materials that had been submitted
12 for FDA review?

13 MR. SOBOL: Objection.

14 A. I did not, no.

15 BY MR. ROTH:

16 Q. Do you agree that opioids have
17 legitimate medical uses for certain diseases
18 and conditions?

19 A. Yes, I would say that's true.
20 According to their label, yes.

21 Q. And you understand that the FDA
22 has approved opioids for certain of these
23 conditions in their labels?

24 A. Yes, I understand that the
25 approved labels include those conditions for

1 which the FDA has deemed them appropriate.

2 Q. Did you review any drug labels
3 in connection with your work in this case for
4 prescription opioids?

5 A. I have looked at some of the
6 drug labels, yes.

7 Q. Do you recall which drug labels
8 you reviewed?

9 A. I believe for OxyContin and
10 hydrocodone.

11 Q. Did you review any labels
12 beyond that that you recall?

13 A. Not that I recall.

14 Q. And I've looked at
15 Attachment B. I don't think I saw drug
16 labels on your reliance list; is that
17 correct?

18 A. That's correct.

19 Q. Do you understand that
20 prescription opioids are approved in their
21 labels for the treatment of chronic pain?

22 MR. SOBOL: Objection.

23 A. As I sit here, I couldn't tell
24 you which drugs have approvals for chronic
25 pain on their labels, no.

1 BY MR. ROTH:

2 Q. Do you recall whether the
3 OxyContin and hydrocodone labels you reviewed
4 contained approvals for chronic pain for
5 those drugs?

6 MR. SOBOL: Objection, scope.

7 A. I do not.

8 MR. SOBOL: Just give me a
9 little bit of a chance to get my
10 objections in, Professor. Just a
11 nanosecond.

12 A. I do not recall.

13 BY MR. ROTH:

14 Q. Have you ever taken a
15 prescription opioid before?

16 A. I have not.

17 Q. Have you reviewed any medical
18 literature or guidelines on which uses
19 prescription opioids are FDA approved for?

20 A. In the context of my report, I
21 discuss some of the guidelines, so I -- and
22 I've certainly reviewed those, for example,
23 the CDC guidelines. I don't know if that's
24 what you're referring to. I'm not
25 specifically myself offering an opinion on

1 those guidelines. As you know, as we just
2 discussed, I'm not a clinical expert or a
3 pharmacologist, but I'm certainly aware of
4 guidelines that talk about the appropriate
5 uses of opioids.

6 Q. Do you know the most common
7 uses of opioids for which health insurers and
8 federal Medicare or state Medicaid agencies
9 reimburse use?

10 MR. SOBOL: Objection.

11 A. As I sit here, do I know which
12 uses are most prevalent across all those
13 payors? No. No, I do not.

14 BY MR. ROTH:

15 Q. Do you know whether Medicare,
16 for example, reimburses patients for the use
17 of prescription opioids for the treatment of
18 chronic pain?

19 MR. SOBOL: Objection.

20 A. Well, I think you would be
21 talking about Medicare Part D. Just to be
22 clear, those are private insurers that are
23 acting in the service of Medicare
24 beneficiaries, and each, of course, has a
25 different formulary and may use different

1 mechanisms to ensure appropriate drug use.

2 So I think it would be hard to
3 characterize that as Medicare as a whole.

4 BY MR. ROTH:

5 Q. Do you know whether any of the
6 Medicare Part D insurers approve the use of
7 opioids on their formularies for the
8 treatment of chronic pain?

9 MR. SOBOL: Objection.

10 A. I do not know one way or the
11 other. I do not believe that -- I do not
12 know one way or the other whether there are
13 restrictions relative to the uses of
14 particular drugs for particular indications.

15 BY MR. ROTH:

16 Q. Okay. I'm going to mark as
17 Exhibit 3 to your deposition a document that
18 I pulled from your reliance list. It's
19 titled Medicare Program Policies and
20 Procedures, and it was linked to the Excellus
21 Blue Cross Blue Shield page.

22 (Whereupon, Deposition Exhibit
23 Rosenthal-3, Medicare Program
24 Policies & Procedures, was marked for
25 identification.)

1 BY MR. ROTH:

2 Q. Do you see that document?

3 A. I do.

4 Q. And do you recognize this
5 document as one that you reviewed?

6 A. I do.

7 Q. Okay. So why did you have your
8 team pull this document and why did you
9 review it in your work in this case?

10 A. I'd actually have to look in my
11 report to see what I cite it for
12 specifically.

13 Q. Okay. If you look on the first
14 page, it says: Summary of Formulary Level
15 Opioid POS for Calendar Year 2019.

16 Do you see that?

17 A. I do. And just to be clear,
18 this is a single Medicare Part D carrier.
19 This is not official Medicare policy per se.

20 Q. Right.

21 A. But yes.

22 Q. So if you look at page 3 of
23 this document, it talks about the review
24 criteria for Blue Cross Blue Shield for
25 opioid, seven-day supply limits.

1 Do you see that?

2 A. I do.

3 MR. SOBOL: Objection.

4 BY MR. ROTH:

5 Q. And then the first bullet -- or
6 it says before the bullets: An exception to
7 the seven-day quantity limit of a shorter
8 long-acting opioid may be permitted in
9 patients who meet one of the following
10 criteria, A through F below.

11 Do you see that?

12 A. I do.

13 Q. And then the first bullet says:
14 Approval will be a 30-day override for
15 scenarios A, B, C, D and E below.

16 And then there's a second
17 bullet below that. Do you see that?

18 A. Yes.

19 Q. And it says: Approval will be
20 a 30-day override for scenario F below.

21 Do you see that?

22 A. I do.

23 Q. And then under that bullet is E
24 where it says: The requesting physician
25 provides a supporting statement/attests that

1 a prescription for greater than a seven-day
2 supply is medically necessary to manage the
3 patient's pain.

4 Do you see that?

5 A. I do.

6 Q. And so at least for Blue Cross
7 Blue Shield, it appears in their formulary
8 they have a mechanism for approving the use
9 of opioids to treat pain for longer than
10 seven days?

11 MR. SOBOL: Objection. Blue
12 Cross Blue Shield of? Question mark.

13 THE WITNESS: Are you waiting
14 for me to answer your question?

15 MR. ROTH: I was.

16 A. This -- in this Excellus
17 formulary, they do indicate -- obviously this
18 is 2019. They do indicate that mechanism.
19 You had asked me before about chronic pain.
20 I don't know if you're trying to infer that
21 anything longer than seven days is chronic.
22 I think that's not exactly the definition of
23 chronic pain, so...

24 BY MR. ROTH:

25 Q. We'll get there.

1 A. Okay.

2 Q. I promise.

3 MR. SOBOL: I'll write that
4 down.

5 BY MR. ROTH:

6 Q. Your direct and indirect
7 regressions do not make any attempt to
8 differentiate legitimate prescriptions from
9 medically unnecessary ones; is that correct?

10 MR. SOBOL: Objection.

11 A. The goal of my analysis is to
12 examine the impact of the alleged misconduct,
13 and so I appropriately quantify all
14 prescriptions caused by the alleged unlawful
15 marketing.

16 BY MR. ROTH:

17 Q. You're not an expert in
18 pharmaceutical marketing practices, correct?

19 A. I am not an expert in
20 pharmaceutical marketing practices, although,
21 again, I have studied pharmaceutical
22 marketing and its effects and so I have a
23 high degree of familiarity.

24 Q. But you're not opining on which
25 of defendants' marketing practices were

1 unlawful?

2 A. That's correct. I have been
3 asked to assume that the marketing practices
4 during the period from 1995 through the end
5 of my data were unlawful.

6 Q. And do you rely on anything
7 besides counsel's instruction to you to make
8 that assumption?

9 A. Well, as you can see in my
10 report, I have reviewed documents, testimony
11 from other experts. I understand the context
12 in which the alleged misconduct took place,
13 and so I have examined that assumption using
14 my expertise.

15 Q. But you're not offering an
16 opinion as to whether that assumption is
17 correct, or not?

18 A. I am not offering an opinion
19 about that assumption, no.

20 Q. And one of the sources you
21 relied on to test the instruction that all of
22 defendants' misconduct was unlawful was
23 Dr. Perri; is that right?

24 A. Yes, he is one of the other
25 experts I refer to.

1 Q. And are you aware that
2 Dr. Perri testified last week that he didn't
3 evaluate whether defendants' marketing was
4 lawful or appropriate?

5 MR. SOBOL: Objection.

6 A. Well, Dr. Perri is not a
7 lawyer, so I would not expect him to deem
8 anything lawful. He describes how
9 defendants' marketing efforts work, the
10 extent to which they conformed with standard
11 marketing practices, the extent to which he
12 deemed them appropriate as a pharmaceutical
13 marketer, as opposed to unlawful.

14 BY MR. ROTH:

15 Q. So there's no expert that
16 you're relying on that makes that legal
17 conclusion as to whether defendants'
18 marketing was lawful or not. Is that your
19 understanding?

20 A. I'm relying on instructions
21 from counsel about the -- is lawfulness a
22 word? About the legality of the connect
23 conduct in question.

24 Q. You're relying on counsel's
25 confidence that they can prove that all of

1 defendants' marketing was unlawful when they
2 try their case some day?

3 MR. SOBOL: Objection.

4 A. I'm relying on instructions
5 from counsel, yes.

6 BY MR. ROTH:

7 Q. You're not an expert on the
8 DEA?

9 A. I am not an expert on the DEA.

10 Q. And you're not an expert in
11 suspicious order monitoring?

12 A. I am not.

13 Q. Your analyses do not attempt to
14 attribute any causality to opioid
15 manufacturers or distributors for alleged
16 suspicious order monitoring deficiencies,
17 correct?

18 A. I'm sorry. Could you just
19 repeat that question? There was a lot there.

20 Q. Your analyses do not attempt to
21 attribute any causality to opioid
22 manufacturers or distributors for alleged
23 suspicious order monitoring deficiencies?

24 A. No, my analysis does not
25 attribute causality related to those

1 distributors.

2 Q. And, in fact, your analysis
3 does not attempt to attribute any causality
4 to distributors or pharmacies for any
5 activities that they conducted related to the
6 opioid issue?

7 MR. SOBOL: Objection.

8 A. I was not asked to examine
9 issues of causality related to the
10 nonmarketing defendants. Is it okay if I use
11 that term, "marketing defendants," to
12 describe what is in my report?

13 BY MR. ROTH:

14 Q. I'll use a different term if I
15 need to, but I understand what you're saying.

16 A. Okay.

17 Q. You're not an expert in the
18 diversion of drugs for illicit use?

19 A. I'm not an expert in diversion,
20 no.

21 Q. And your analyses do not
22 attribute any causality for the -- what you
23 call the opioid epidemic to criminal
24 diversion or drug cartels?

25 A. I have not examined the

1 question of causality related to diversion
2 and criminal activity.

3 Q. Your analyses do not attribute
4 any causality to government agencies for
5 approving opioids for certain medical uses --

6 MR. SOBOL: Objection.

7 BY MR. ROTH:

8 Q. -- in the scope of the opioid
9 epidemic?

10 MR. SOBOL: Objection.

11 A. I have not tried to examine --
12 I guess I'm not entirely sure what that
13 analysis would look like, but I have not
14 tried to examine the effects of specific
15 scope -- of the scope of approval for opioids
16 and whether it had been different, whether
17 the results would have been different.

18 BY MR. ROTH:

19 Q. Okay. If you turn to
20 paragraph 6 of your report, you describe the
21 allegations in the bellwether complaints.

22 Do you see that?

23 A. Yes.

24 Q. You say: I understand that
25 this litigation brought by the City of

1 Cleveland, the City of Akron, Cuyahoga County
2 and Summit County, collectively the
3 bellwether governments, alleges -- and then
4 it goes on.

5 Do you see that?

6 A. Yes.

7 Q. Do you understand that the City
8 of Cleveland and the City of Akron are not
9 bellwether plaintiffs at this time?

10 A. I do understand that.

11 Q. And then when you describe what
12 the complaints say, you say: The bellwether
13 governments allege, among other things, that
14 the defendants' conduct in promoting opioid
15 use, addiction, abuse, overdose and death has
16 had severe and far-reaching public health,
17 social services and criminal justice
18 consequences, including the fueling of
19 addiction and overdose from illicit drugs
20 such as heroin.

21 Do you see that?

22 A. I do.

23 Q. And then you go on to say: The
24 governments further allege that the opioid
25 epidemic and the need for increased services

1 arose from the opioid manufacturers'
2 deliberately deceptive marketing strategy to
3 expand opioid use, together with the
4 distributors' equally deliberate efforts to
5 evade restriction on opioid distribution.

6 Do you see that?

7 A. I do.

8 Q. Who are the manufacturers
9 you're referring to in paragraph 6?

10 A. The manufacturers who are the
11 defendants in this matter who marketed any of
12 the drugs at issue here.

13 Q. And what is the misconduct that
14 you're referring to in paragraph 6 that those
15 manufacturers engaged in?

16 A. Its allegedly unlawful
17 marketing, deceptive marketing of opioids.

18 Q. And what do you understand that
19 deceptive marketing strategy to include?

20 A. That deceptive marketing
21 strategy includes classical marketing tactics
22 such as detailing which we'll no doubt
23 discuss later is the most prominent form of
24 marketing in this sector, as well as
25 so-called unbranded advertising, which may

1 come in the form of patient information,
2 payments made to patient and professional
3 organizations that created guidelines around
4 the use of opioids for pain. All of those
5 tactics that I describe in greater detail in
6 my report.

7 Q. And who are the distributors
8 you're referring to in paragraph 6?

9 A. The distributors are McKesson,
10 AmerisourceBergen. And there's a third, I'm
11 sorry, memory test on the defendants that I
12 did not look at. At the moment the third one
13 is escaping me.

14 Q. When you refer to the
15 distributors' deliberate efforts to evade
16 restriction on opioid distribution, what are
17 you referring to?

18 A. Well, again, here, as you see,
19 I'm quoting the complaint, and I understand
20 that the distributors have an obligation to
21 prevent so-called suspicious orders.

22 Q. And you didn't evaluate or
23 analyze how the distributors complied with
24 those obligations and how that might affect
25 causality; is that correct?

1 MR. SOBOL: Objection.

2 Objection, asked and answered.

3 A. I did not evaluate the
4 distributors' conduct, no.

5 BY MR. ROTH:

6 Q. So your models provide no
7 analysis of causation by distributors or
8 pharmacies for what plaintiffs allege is the
9 opioid epidemic, correct?

10 MR. SOBOL: Objection, asked
11 and answered.

12 A. The distributors' conduct was
13 outside the scope of my report.

14 BY MR. ROTH:

15 Q. I want to take a look at the
16 complaints you site in footnote 18 and 19. I
17 assume you looked at those complaints?

18 A. I did.

19 Q. Okay. So I'm going to mark as
20 Exhibit 4...

21 A. That is clearly not the whole
22 complaint because I happen to know that it's
23 several inches thick.

24 Q. Correct. You're right. I'm
25 going to mark as Exhibit 4 just the cover

1 page and the paragraph I want to ask you
2 about, from the Second Amended Complaint
3 filed by Summit County.

4 (Whereupon, Deposition Exhibit
5 Rosenthal-4, Second Amended Complaint
6 and Jury Demand, was marked for
7 identification.)

8 BY MR. ROTH:

9 Q. Do you have that in front of
10 you?

11 A. I do.

12 Q. And if you look at
13 paragraph 10, which I excerpted from the
14 complaint. Do you see it?

15 A. Yes.

16 Q. It says: On the demand side,
17 the crisis was precipitated by the defendants
18 who manufacture, sell and market prescription
19 opioid painkillers, defined as the marketing
20 defendants.

21 Do you see that?

22 A. I do.

23 Q. And then it says: Through a
24 massive marketing campaign premised on false
25 and incomplete information, the marketing

1 defendants engineered a dramatic shift in how
2 and when opioids are prescribed by the
3 medical community and used by patients.

4 Do you see that?

5 A. I do.

6 Q. What do you understand to be
7 the false and incomplete information that the
8 alleged marketing campaign was premised on?

9 A. There are a number of
10 components. At a high level, the main issue
11 as I understand it as a health economist, not
12 as a clinician, is -- was the -- that it was
13 conveyed to physicians and to the public that
14 opioids were safe; that the possibility of
15 addiction was relatively low; that these
16 drugs were effective, not just for cancer
17 pain, but for a wide variety of acute and
18 chronic pain.

19 And then there were other
20 messages that were conveyed that supported
21 those general premises, including the fact
22 that extended release formulations of opioids
23 would smooth out the peaks and valleys of
24 pain control; that as patients became
25 tolerant to these drugs, that this was a

1 natural phenomenon and not a sign of
2 addiction.

3 There were certain notions such
4 as pseudoaddiction that were promoted through
5 communication by the marketing defendants.
6 And at the same time, it was also conveyed
7 that physicians could identify some small
8 group of patients who might be more likely to
9 abuse opioids and prevent and control abuse,
10 that this was an issue related to the
11 individual characteristics and not to the
12 products themselves.

13 Q. Okay. What analysis did you do
14 to test whether the detailing visits you
15 analyzed communicated that false and
16 incomplete information as you just described
17 it during those visits?

18 A. Well, I think you misunderstand
19 the entire premise here. As I noted earlier,
20 detailing, while it is the promotional tactic
21 that I can best measure and use in my
22 analysis, the allegations suggest that this
23 campaign of misinformation permeated through
24 many other vehicles.

25 And so it's not in my view,

1 again, as a health economist, a question of
2 ascertaining what was in a particular detail,
3 but what was available in -- through key
4 opinion leaders, what was available through
5 professional guidelines, all of that setting
6 the context. So it's not so much about
7 looking for one co-mission as a much broader
8 picture of what the information was that was
9 conveyed.

10 Q. Okay. You've testified as a
11 causation or damages expert before, correct?

12 MR. SOBOL: Objection.

13 A. I have.

14 BY MR. ROTH:

15 Q. And in general, you understand
16 that to opine on causation or damages, you
17 have to tie the theory of liability to
18 damages?

19 MR. SOBOL: Objection.

20 A. Yes, and I have done that in my
21 report.

22 BY MR. ROTH:

23 Q. Okay. The complaint defines a
24 theory of liability here as false and
25 incomplete information, correct?

1 A. Yes, correct.

2 Q. What have you done to confirm
3 that the detailing visits you analyzed
4 actually contained false and incomplete
5 information as the complaint or you define
6 it?

7 MR. SOBOL: Objection, just
8 asked and answered.

9 A. As we talked about earlier,
10 I've been asked to assume that counsel will
11 prove that all or virtually all marketing
12 during the period from 1995 to the end of my
13 data was unlawful.

14 So I have tested the
15 reasonableness of that assumption in the
16 review of the documents that we've talked
17 about, in the review of other expert
18 opinions.

19 I have not, nor do I believe
20 it's necessary to make that causal step,
21 looked at individual details throughout the
22 period for my analysis.

23 BY MR. ROTH:

24 Q. You would agree that detailing
25 in and of itself is not unlawful?

1 MR. SOBOL: Objection.

2 A. Well, again, if that detailing
3 is conveying false and misleading
4 information, I understand -- I'm not a
5 lawyer, but I understand that it would be
6 unlawful. And so, you know, I do not -- I am
7 not making an assumption that detailing in
8 general is unlawful but that this detailing
9 can be proved to be unlawful.

10 BY MR. ROTH:

11 Q. A pharmaceutical rep going to a
12 doctor to drop off a pizza could be
13 considered a detailing visit, correct?

14 MR. SOBOL: Objection.

15 A. A detailing visit generally
16 involves the conveyance of some information,
17 maybe a pizza in addition, but the details
18 that I'm looking at, there is a specific
19 product mentioned.

20 BY MR. ROTH:

21 Q. But detailing visits can take
22 many forms, correct?

23 MR. SOBOL: Objection.

24 A. Well, I'm not sure exactly what
25 you mean by it. There's information conveyed

1 about a product or a set of products, and
2 detailing visits are face-to-face visits
3 between the salesperson and someone in the
4 physician's office.

5 BY MR. ROTH:

6 Q. But you know that detailing
7 could just be the sales rep dropping off a
8 placard with the product's label on it?

9 MR. SOBOL: Objection.

10 A. I think you misunderstand,
11 again, the interconnectedness of all of this.
12 And so if a detail were something like you
13 just described -- I don't know about a
14 placard, how about a coffee mug -- those
15 details are intended to reinforce messages
16 that have been conveyed in previous details
17 that have been conveyed by key opinion
18 leaders.

19 I don't think it's appropriate
20 to pull these individual pieces out as if
21 they were not part of an integrated marketing
22 scheme, which is really precisely what
23 Dr. Perri talks about in his report.

24 BY MR. ROTH:

25 Q. But you're not offering the

1 opinion that every time a sales rep detailed
2 a doctor for an opioid product, that was
3 unlawful?

4 MR. SOBOL: Objection.

5 A. I am not offering any opinion
6 about the unlawfulness of detailing, as we
7 have spoken about before. I was asked to
8 assume that plaintiffs' counsel would prove
9 that marketing was unlawful.

10 BY MR. ROTH:

11 Q. We'll come back to this, but
12 I'll give you a break from it.

13 If you look back at
14 paragraph 7, you say in paragraph 7 of your
15 report -- sorry: In this report I refer to
16 the manufacturers' deceptive marketing
17 strategy and tactics as manufacturer
18 misconduct. This report does not address
19 nonmarketing misconduct.

20 Do you see that?

21 A. Yes.

22 Q. What is your definition of
23 nonmarketing misconduct?

24 A. By that, I mean to describe
25 misconduct related to identifying and

1 intervening with suspicious shipments, the
2 distributor misconduct, as I understand it,
3 yes.

4 Q. Okay. And then in paragraph 8
5 you say: My assignment is to answer the
6 following questions framed by plaintiffs'
7 counsel.

8 Do you see that?

9 A. I do.

10 Q. And each of the bullets is
11 bounded -- I guess with the exception of the
12 sensitivity -- each of the first three
13 bullets is bounded by the year 1995.

14 Do you see that?

15 A. Yes.

16 Q. So since 1995 I'm going to look
17 at causation.

18 Can you explain why 1995 was
19 selected?

20 MR. SOBOL: Objection.

21 No discussions with counsel,
22 but if you have a general
23 understanding, that's fine.

24 A. My general understanding is
25 that counsel for plaintiffs intend to prove

1 that marketing since 1995 was unlawful.

2 BY MR. ROTH:

3 Q. Do you have any independent
4 understanding as to why that would be a good
5 measuring date?

6 A. As I sit here specifically, no.
7 It will get into the specific facts that I
8 describe in my report in terms of what is
9 happening in opioid prescribing in the world
10 in 1995, and that is certainly a turning
11 point in the -- in opioid use, as you can see
12 from the sales data I have.

13 Q. Is there a specific event that
14 happened in 1995 that you believe was the
15 start of the unlawful marketing scheme
16 alleged in the complaint?

17 A. As I sit here, I can't think of
18 anything specifically, no.

19 Q. Okay. I'm sure we'll talk
20 about this later, but I know from sitting
21 through Professor McGuire's deposition and
22 Professor Cutler's deposition, that as
23 Professor McGuire described it, there was a
24 triumvirate of damages experts in this case?

25 A. Quadrumvirate.

1 Q. If you include Professor
2 Gruber?

3 A. Yes.

4 MR. SOBOL: You can't forget
5 John.

6 BY MR. ROTH:

7 Q. So you understand, I take it,
8 that Professor Cutler calculates harms
9 beginning in 2006?

10 A. Yes.

11 Q. And did you review his report
12 before finalizing your report?

13 A. Before finalizing my report, I
14 believe I did.

15 Q. And you had conversations with
16 him about your models and I assume about his
17 models as well?

18 A. With counsel present, we talked
19 about the work as a whole.

20 Q. Okay. Do you know why
21 calculating a harm from 2006 forward as he
22 does requires looking at misconduct dating
23 back to 1995?

24 MR. SOBOL: You can answer only
25 if it's not based on counsel.

1 A. Based on my understanding of
2 the economic phenomena of interest, yes. So,
3 as I'm sure we will discuss and you know, my
4 model examines the effects of marketing over
5 time, and marketing has long-lasting effects.
6 So what happened in 1995 is still affecting
7 the world in 2006.

8 Moreover, of course, harms such
9 as overdose deaths are lagged somewhat to the
10 start of someone's experience taking an
11 opioid. So it's important to take a look at
12 the entire time period.

13 BY MR. ROTH:

14 Q. And we will talk about the
15 stock of promotion and how you calculate
16 that.

17 But the way you calculate that,
18 if you started back in 1990 or 1985, it would
19 still have an impact on 2006; isn't that
20 right?

21 MR. SOBOL: Objection.

22 A. What's important is when the
23 but-for marketing departs from actual
24 marketing, so that is why those earlier
25 periods matter and going back to 1985

1 wouldn't matter because but-for and actual
2 marketing are the same.

3 BY MR. ROTH:

4 Q. And the reason you say but-for
5 and actual marketing are the same is the
6 assumption that the scheme started in 1995?

7 MR. SOBOL: Objection.

8 A. Yes, the assumption that I used
9 to calculate but-for marketing is that the
10 defendants' marketing after 1995 was
11 unlawful.

12 BY MR. ROTH:

13 Q. You have not done any analysis
14 of causation as to non-defendant
15 manufacturers; is that correct?

16 MR. SOBOL: Objection.

17 A. Well, my model includes all
18 opioids in this category. We can talk about
19 I exclude the injectables. There's some
20 exclusions.

21 But I examined the effect of
22 marketing on sales beyond the defendants, so
23 I provide causal estimates of the effective
24 marketing on sales for non-defendants. And
25 then separately, again, I'm sure we will get

1 to this, I break out non-defendant marketing
2 on behalf of defendants in my Table 3.

3 So I am looking at causation
4 for non-defendants. I'm simply not
5 attributing it to misconduct and therefore
6 passing it on to Professor Cutler.

7 BY MR. ROTH:

8 Q. And with respect to the
9 non-defendants, you're doing it on an
10 aggregate basis as opposed to specific
11 companies; is that correct?

12 A. My main analysis is on an
13 aggregate basis, and then I do some
14 sensitivity analysis where I remove
15 individual defendants and then all the
16 non-defendants' marketing on behalf of
17 defendants.

18 Q. Do you know whether any of the
19 non-defendant manufacturers utilize similar
20 messaging in their promotional visits to the
21 ones that the defendant manufacturers did
22 that you described as the fraudulent scheme
23 earlier?

24 A. I have not examined that
25 question, no.

1 Q. And if a court or jury were to
2 find that those types of messages were
3 unlawful for defendants, how would that
4 affect how you calculate causation with
5 respect to the non-defendants?

6 MR. SOBOL: Objection.

7 A. That seems to me to be a legal
8 question. This matter has a specific set of
9 defendants, and I am calculating impact for
10 those defendants. I'm not sure if you're
11 suggesting if I could include other
12 manufacturers in those calculations?

13 Absolutely. But that seems like it would be
14 outside the scope of this matter.

15 BY MR. ROTH:

16 Q. And I think we talked about the
17 illegal drug trade, but specifically, have
18 you done any analysis as to causation with
19 respect to pill mills?

20 MR. SOBOL: Objection.

21 A. No, I have not.

22 BY MR. ROTH:

23 Q. Or cartels or Internet sales of
24 opioids?

25 A. No, I have not.

1 Q. You've done no analysis as to
2 causation due to changes in reimbursement
3 policies for prescription opioids?

4 MR. SOBOL: Objection.

5 A. I have not looked at changes in
6 reimbursements specifically, no.

7 BY MR. ROTH:

8 Q. You've done no analysis as to
9 causation as to changes in medical guidelines
10 for the use of opioids?

11 A. Well, I do, as you know, in one
12 model look at the effects of certain
13 guideline-related events, so that happens in
14 my Model C. But aside from that, I have not
15 modeled other changes in guidelines, but to
16 some extent there, yes.

17 Q. You've done no analysis of
18 causation as to patients or users of
19 prescription opioids?

20 MR. SOBOL: Objection.

21 A. I'm not really sure what you
22 mean by that. My analysis is an
23 industry-level analysis, so the patients of
24 course are the ones filling the prescriptions
25 that I'm counting and measuring.

1 So in the indirect analysis, I
2 look at population characteristics as they
3 are associated with shipments,
4 cross-sectionally, so that is in some sense a
5 patient-level analysis. I'm not entirely
6 sure what you had in mind, however.

7 BY MR. ROTH:

8 Q. You don't attribute any
9 causality to prescribing doctors?

10 MR. SOBOL: Objection.

11 A. Again, I am -- marketing is to
12 doctors, and the doctors have to write the
13 prescriptions, so they are in the causal
14 chain of my analysis.

15 The mechanism is a detailing
16 contact. If doctors did not respond to those
17 details, then they -- my results would be
18 quite different.

19 BY MR. ROTH:

20 Q. I understand they're in the
21 causal chain. What I'm trying to understand
22 is how your models assign a percentage of
23 causality to prescribing doctors.

24 MR. SOBOL: Objection.

25 A. Again, from my point of view,

1 the question doesn't make a lot of sense to
2 me because of the fact there is this causal
3 chain, and what I've been asked to undertake
4 is an analysis of the impact of the allegedly
5 unlawful marketing.

6 It goes through doctors, so
7 there -- the idea that there's a separate
8 analysis of the effect of doctors on
9 prescribing, they're already in my analysis.
10 The question about parsing liability for
11 those groups, I have not undertaken that
12 because I'm not a lawyer, and I was not asked
13 to offer an opinion on that.

14 BY MR. ROTH:

15 Q. And when you say the doctors
16 are already in the analysis, they're in the
17 analysis to the extent you're talking about
18 detailing, but other factors that may
19 influence the doctors' prescribing decision
20 are not accounted for in your analysis,
21 correct?

22 MR. SOBOL: Objection.

23 A. Well, again, I would say that's
24 not entirely correct because these other
25 factors that I capture in my model using

1 those eras, in addition in Model C, using the
2 specific dummy variables, those operate
3 through physicians.

4 And again, because these are
5 prescribed products, the doctor has to write
6 the prescription in every case, so even, you
7 know, efforts, for example, to change the way
8 state medical boards enforce prescribing
9 around opioids, that's -- that's ultimately
10 directed at doctors.

11 BY MR. ROTH:

12 Q. You agree that doctors act as a
13 trusted intermediary when it comes to
14 prescribing opioids?

15 MR. SOBOL: Objection.

16 A. As a matter of the way this
17 market works, yes, that doctors are intended
18 to be the agents of their patients.

19 BY MR. ROTH:

20 Q. You say in your report,
21 paragraph 14: Physicians act as a trusted
22 intermediary in prescription drug
23 decision-making.

24 MR. SOBOL: Objection.

25 A. Yes.

1 BY MR. ROTH:

2 Q. And, in fact, you just said
3 patients cannot lawfully obtain prescription
4 opioids without a doctor's prescription.

5 MR. SOBOL: Objection.

6 A. Yes, that is correct.

7 BY MR. ROTH:

8 Q. So the doctor's an essential
9 link in a patient legally obtaining
10 prescription opioids.

11 A. Yes, physicians must write
12 those prescriptions for them to be legal.

13 Q. And you agree that while
14 patient preferences play a role in the choice
15 of therapy, physicians have enormous
16 influence over healthcare decisions?

17 MR. SOBOL: Objection.

18 A. Yes, I believe you just quoted
19 me.

20 BY MR. ROTH:

21 Q. And to quote you again:
22 Professional norms encourage physicians to
23 use their clinical skills, knowledge and
24 experience to make therapeutic choices that
25 are in the best interest of their patients?

1 A. Just to be clear, I make those
2 points because this is the reason why
3 physicians are the target for this kind of
4 misleading marketing, but it would not be
5 enough, for example, to mislead patients
6 through some direct-to-consumer advertising
7 campaign.

8 This is why physicians are the
9 target of this misinformation is because
10 patients trust them.

11 Q. Okay. But clearly, marketing
12 is not the only thing that controls a
13 doctor's prescribing decision, correct?

14 A. Marketing -- I think it depends
15 on how you describe marketing, and in my
16 report, I give a sort of ecosystem around
17 which physician behavior is affected and
18 patient behavior. So we can think about
19 marketing as details. That is clearly not
20 the only thing that affects physician
21 decision-making, but professional guidelines
22 also do. What their peers say and do also
23 does.

24 All of those things were
25 affected by the alleged misconduct.

1 Q. Okay. So other than detailing
2 visits, professional guidelines and what
3 physicians' peers do, can you think of any
4 other factors that influence a doctor's
5 prescribing decisions when it comes to a
6 product like prescription opioids?

7 A. Well, clearly doctors rely in
8 part on the product label. I think there's
9 some debate as to how much they rely on the
10 product label, and if you've tried to read
11 them, they're -- they tend to be very dense.

12 The beauty of marketing
13 messages is that they are very simple, easy
14 to follow.

15 Q. Okay. You understand that
16 opioids have black box warnings on their
17 product label?

18 A. Yes, I do understand that.

19 Q. And you understand that the FDA
20 has issued a REMS program for certain
21 opioids?

22 A. Yes, I understand that.

23 Q. And do you know what a REMS is?

24 A. The acronym, actually, I cannot
25 say exactly what it is, but it is a condition

1 for prescribing. They differ by drug, so a
2 well-known one is that females who want to be
3 on Accutane, they all have to be on some kind
4 of contraceptive. Products come with some
5 conditions to ensure their safe use.

6 Q. Have you performed any study or
7 analysis of the effect that a black box
8 warning has on the prescription of a product
9 with a black box warning like opioids?

10 MR. SOBOL: Objection.

11 A. I haven't specifically examined
12 the effects of a black box warning. Again,
13 in my description of the timeline of events
14 here, I include those -- the black box
15 warning, the REMS, for extended release and
16 long-acting opioids as part of my timeline.

17 You know, as a matter of the
18 way the -- both the marketing schemes and the
19 public health responses unfolded in this
20 matter, there were many changes, all around
21 the same time, making it difficult to
22 identify the effect of any one of them.

23 So I haven't done a regression
24 specifically with the black box warning in
25 it. If you look at the data, however,

1 there's no sharp fall-off when the black box
2 warning comes up.

3 BY MR. ROTH:

4 Q. Are you aware of any literature
5 that reviews how a black box warning affects
6 the impact of marketing for the product with
7 a black box warning on prescribing
8 physicians?

9 A. I'm aware that such literature
10 exists, and I've certainly looked in detail
11 at that matter in the case of other products
12 such as antipsychotics, where marketing
13 essentially was designed to counteract the
14 black box warning, so I think that's commonly
15 a strategy by manufacturers is to try to
16 soften the effects of the black box warning.

17 And in published literature,
18 there's a mixed view about how effective
19 black box warnings are in changing behavior.

20 Q. And can you think of any study
21 as you sit here today that says that even in
22 the face of a black box warning, physicians
23 will prescribe the products in a way that is
24 antithetical to the black box warning?

25 MR. SOBOL: Objection.

1 A. I can't think of a specific
2 paper. I can recall a specific analysis that
3 I did looking at antipsychotics when the
4 black box warning went into effect that
5 basically said there's a substantial increase
6 in mortality for the elderly for -- using
7 antipsychotics, which was generally done as a
8 method of chemical control for patients in
9 long-term care in particular. And
10 physicians, while there was an initial drop
11 in prescribing it, very quickly went back to
12 existing levels despite the fact that there
13 were these very severe consequences.

14 BY MR. ROTH:

15 Q. But you haven't performed that
16 analysis for any prescription opioid product
17 at issue in this case?

18 A. I have not.

19 Q. So you don't know how the black
20 box warning or the REMS impacted the
21 effectiveness of defendants' marketing on
22 opioids?

23 MR. SOBOL: Objection.

24 Objection.

25 A. Again, I attempt to capture

1 some of those factors in the nature of my
2 model, which we will no doubt talk about,
3 and, in fact, the effectiveness of marketing
4 begins to decline around the period that
5 these policies went into effect.

6 And so I do capture that by
7 allowing the environment to change the
8 effectiveness of the marketing.

9 BY MR. ROTH:

10 Q. Have you performed or reviewed
11 any study or analysis of the information
12 available to doctors regarding opioids over
13 time?

14 A. I have reviewed some materials
15 that you can see in my report at a high level
16 in terms of, for example, what -- what the
17 CDC was saying in their guidelines. That's a
18 channel for information, and certainly the
19 REMS, the fact of those coming out.

20 I have not systematically
21 looked at the broader information. I rely in
22 part on other experts to describe that.
23 Again, Dr. Perri's report does quite a bit of
24 that.

25 Q. You understand that opioids

1 have been used for the treatment of pain for
2 centuries?

3 MR. SOBOL: Objection.

4 A. I do understand that opioids,
5 yes, opium and morphine in particular, yes,
6 have been used for many, many decades.

7 BY MR. ROTH:

8 Q. And the addictive property of
9 opiates, whether they be opium or opioids,
10 has also been long known.

11 Would you agree with that?

12 A. Yes. Again, I wouldn't rely on
13 my own expertise for that, but I understand
14 that, certainly, from reading the clinical
15 experts' reports, and as a general matter I
16 believe it's long been known that opium and
17 morphine were addictive, in the Civil War and
18 before that.

19 Q. You say in paragraph 15 of your
20 report that both physicians and patients --
21 let me know when you're there. Got it?

22 A. Yes.

23 Q. Both physicians and patients
24 face an information problem in selecting
25 pharmaceutical treatments that challenges

1 typical conclusions about well-functioning
2 markets.

3 Do you see that?

4 A. Yes.

5 Q. And that paragraph goes on to
6 talk about how these are experienced goods,
7 and further down: For example, and in the
8 present matter, the stigma associated with
9 opioid addiction likely compounded the
10 information problems.

11 And then the last sentence: In
12 light of these information problems, it would
13 be reasonable to expect that market forces
14 alone would fail to protect consumers against
15 false claims of product efficacy and safety.

16 Do you see that?

17 A. Yes, I do.

18 Q. I notice you don't call out
19 addictiveness separately. I mean, do you
20 think that there's insufficient market
21 information for doctors or the general public
22 to know about the addictiveness of
23 prescription opioids?

24 A. I intended to include
25 addiction, which is clearly the biggest risk

1 of opioids, when I was talking about risks
2 and side effects. It's a more general
3 statement here, but that was my intention.

4 And, yes, as I -- as I
5 understand the facts here, while doctors
6 understood that opiates and opioids had
7 addictive properties, that because of the
8 defendants' misconduct, there was essentially
9 a shift in the belief about the relative
10 trade-offs between addiction risk and pain
11 control, and that again, the addiction risks
12 were downplayed substantially, despite prior
13 knowledge that these newer products were
14 somehow different and would somehow not
15 deliver the same addiction risk.

16 Q. Okay. But at a certain point
17 in time market information can become robust
18 enough that the players in the market
19 understand the true nature of what they're
20 dealing with.

21 Do you agree with that as a
22 general proposition?

23 MR. SOBOL: Objection.

24 A. No, I would not agree with that
25 as a general proposition.

1 BY MR. ROTH:

2 Q. So you think the market just
3 never has enough information for people to
4 make informed decisions?

5 A. I'm an empirical economist, and
6 like you, I was aware that opiates had been
7 around for a long time, and yet, in the
8 middle 1990s, we see this dramatic increase
9 in opioid prescribing. To what -- that is
10 clear evidence that something dramatic
11 shifted, and I understand that if the
12 allegations are proven, that something is
13 marketing.

14 I don't think that there's any
15 truth in the world that could not be reversed
16 by good marketing.

17 Q. So your view is even today,
18 with the publicity that the opioid issues
19 have gotten and the CDC guidelines, there
20 still are people with incomplete information
21 that are continuing to be fooled by
22 marketing?

23 MR. SOBOL: Objection.

24 A. I would say that that is very
25 likely, that there are still people who

1 continue to believe that opioid treatment is
2 a relatively safe prescribing opportunity,
3 and certainly, while we've seen a fairly
4 substantial decline in prescribing, it has
5 not yet gone back to 1995 levels.

6 BY MR. ROTH:

7 Q. And you would attribute some of
8 the substantial decline in prescribing to
9 market information coming to light, would you
10 not?

11 A. I would attribute it to public
12 health interventions, some of which are
13 informational, some of which are more
14 restrictive, just simply putting limits on
15 prescribing.

16 So it's a combination of
17 informational and command and control efforts
18 on the public health side.

19 Q. Okay. I think we talked about
20 this, but I'm going to ask again because I'm
21 not sure.

22 You would agree that doctors
23 are motivated by many factors beyond just
24 marketing?

25 MR. SOBOL: Objection.

1 A. I guess I'm not sure the
2 context for that statement, so I -- I would
3 agree that physicians do not rely solely on
4 marketing for decision-making. You said
5 motivated, and I guess I don't know what you
6 mean by that.

7 BY MR. ROTH:

8 Q. I'll take your answer.
9 Physicians do not rely solely
10 on marketing when making a prescribing
11 decision?

12 A. Yes, I think that's true, and
13 still, marketing has a really important
14 effect on their behavior.

15 Q. Physicians rely on clinical
16 results and scientific publications to make
17 prescribing decisions?

18 MR. SOBOL: Objection.

19 A. In some cases, they may do so,
20 and as I note in my report, relying on
21 clinical results when there's not a clear
22 feedback loop, there's not a -- there's not a
23 blood test for pain, so, you know, when I put
24 you on Lipitor, I can check your cholesterol
25 and know whether it's working or not.

1 But when I put you on an
2 opioid, I have to take you at your word about
3 what you're feeling and reporting to me.

4 So I think relying on results
5 is a very tenuous notion in this case.

6 BY MR. ROTH:

7 Q. Is that true for
8 antidepressants as well?

9 A. It may well be true for
10 antidepressants as well.

11 Q. So in your world, are there
12 certain drugs that we just never know the
13 efficacy of because they're essentially
14 subjective in whether or not they're taking
15 effect?

16 MR. SOBOL: Objection.

17 A. I don't yet have my own world.
18 I'm working on that. But in the actual
19 world, there are certain properties of drugs,
20 of certain drugs, that -- where it's really
21 hard to ascertain their effectiveness, and so
22 that's one of the reasons, of course, we rely
23 on randomized control trials that have -- try
24 to clear out a lot of dust and capture
25 information in a systematic way, and purely

1 observing patients over time is a very
2 difficult way to ascertain whether an
3 antidepressant is working, whether an opioid
4 is working, and how.

5 As I noted earlier in our
6 discussion that my understanding of one of
7 the allegations is that defendants encouraged
8 doctors to ignore what would have been signs
9 of addiction by just saying, no, no, that's
10 just the patient adjusting. Of course, you
11 need to titrate up the dose.

12 So I think it's a very
13 complicated situation for physicians or
14 patients to really ascertain what's happening
15 in terms of effectiveness.

16 BY MR. ROTH:

17 Q. You understand, though, that
18 for opioids, the FDA requires randomized
19 clinical trials on efficacy before they
20 approve use of those drugs?

21 A. Yes, I do understand that.
22 Those randomized control trials do not cover
23 every use that physicians ultimately
24 prescribed opioids for, and I think that's
25 part of what the concern here, is the -- what

1 we might in health policy call indication
2 creep.

3 So also, those randomized
4 control trials are very short term. They're
5 always short term by definition because of
6 the cost of undertaking those trials.

7 Q. Okay. None of your models
8 account for the impact of published clinical
9 results for opioids on prescribing doctors,
10 correct?

11 MR. SOBOL: Objection.

12 A. My models do not explicitly
13 account for publications, no.

14 BY MR. ROTH:

15 Q. Do you agree that prescribing
16 habits may be confounded by other unobserved
17 doctor-specific characteristics?

18 A. In a time series analysis, such
19 confounding would only be of concern if the
20 trend in those characteristics was in some
21 way negatively or positively correlated with
22 marketing. I can't think of anything that
23 would fit that category.

24 Q. I'm not talking about your
25 regressions. I'm just asking a more global

1 question, which is: An individual doctor's
2 prescribing habits can be confounded by other
3 unobserved characteristics?

4 MR. SOBOL: Objection.

5 A. I don't know what you mean by
6 confounded. When you say confounded, I am
7 assuming -- and please correct me if I'm
8 wrong -- that you're asking that in a sort of
9 statistical sense.

10 BY MR. ROTH:

11 Q. Yeah. Okay. So, I am.

12 (Whereupon, Deposition Exhibit
13 Rosenthal-5, 2016 Datta and Dave
14 Publication, was marked for
15 identification.)

16 BY MR. ROTH:

17 Q. Let me mark as Exhibit 5 is
18 Datta and Dave study --

19 A. I keep thinking it's "Dah-vay."

20 Q. You know, I did too. Well,
21 however you pronounce the gentleman's name, I
22 apologize, Effects of Physician-directed
23 Pharmaceutical Promotion on Prescription
24 Behaviors: Longitudinal Evidence.

25 Do you have that in front of

1 you?

2 A. I do.

3 Q. And this is a study you rely on
4 and cite in your report?

5 A. That's correct.

6 Q. And this study actually looked
7 at longitudinal evidence and developed a
8 regression to determine the effect of
9 marketing and other behaviors?

10 A. Yes. But just to be clear,
11 when they say longitudinal, they're not
12 wrong, but they're talking about two years of
13 data. This is -- this is a bit different
14 than the aggregate time series that I used.
15 So just to be clear, they have multiple
16 observations per physician over a two-year
17 period.

18 Q. Okay. If you turn to page 456,
19 and at the bottom of the page -- or sorry,
20 let me get myself to the right place. Sorry,
21 it's -- yeah, it's 456, bottom of the page.

22 A. Okay.

23 Q. The very last sentence, it
24 says: Furthermore, the link between DTPP and
25 prescribing habits may be confounded by other

1 unobserved physician-specific characteristics
2 such as inertia in prescribing patterns,
3 brand loyalty, patient mix, tolerance for
4 risks and preferences toward trade-offs
5 between efficacy, contraindications and
6 long-term use for prophylactic purposes.

7 Do you see that?

8 A. Yes. And again, those are all
9 cross-sectional concerns, so when one is
10 doing an analysis, as they do, that
11 incorporates both cross-sectional and time
12 series variation, so they have a panel of
13 physicians that they're looking at their
14 prescribing for a particular herpes drug and
15 its competitors.

16 And when you're looking
17 cross-sectionally like that at
18 physician-level data, you would need to
19 account for those physician characteristics
20 when you're looking at aggregate data over
21 time that you would not need to look for
22 those characteristics.

23 Q. And you look at aggregate data?

24 A. That's correct.

25 Q. Did you try to look at

1 physician-specific cross-sectional data?

2 MR. SOBOL: Objection.

3 A. Unlike Datta and Dave, I do not
4 have promotional data at the individual
5 physician level. As you no doubt noted in
6 their literature review, it's fairly uncommon
7 to be able to get data that have
8 physician-level detailing, which is what they
9 use, as well as prescribing habits. So there
10 are a few marketing scholars who essentially
11 have had good relationships with companies
12 and have been able to get those kinds of
13 data. I don't have access to those data.

14 BY MR. ROTH:

15 Q. Well, you understand that all
16 these companies are defendants in the case
17 and have produced documents as part of the
18 lawsuit, correct?

19 MR. SOBOL: Objection.

20 A. I understand that these
21 companies have produced documents as part of
22 the lawsuit. They have not produced data
23 with detailing information by physician that
24 can be identified and linked to prescribing.

25 ///

1 BY MR. ROTH:

2 Q. And --

3 A. I did look for those data.

4 Q. You did look for it. And
5 that's true of every single manufacturer
6 defendant, there is no physician-level
7 detailing data available?

8 MR. SOBOL: Objection.

9 A. There were no physician-level
10 detailing data for any manufacturer that
11 covered the period of interest. So in order
12 for me to do my analysis, I would need those
13 data for all the defendants for the entire
14 time period.

15 So where -- to the extent that
16 we found any data, they were bits and pieces
17 of contact registries, essentially sales
18 databases, which are not the same level as
19 what these folks have -- they have actual
20 linked data, linkable.

21 BY MR. ROTH:

22 Q. But you didn't take the
23 specific data you had for individual
24 defendants for whatever time period you had
25 to test the results of your regression

1 against a model you could do on just that
2 data?

3 MR. SOBOL: Objection, form and
4 asked and answered.

5 A. There would be no such test.
6 These -- the goal of my analysis and the goal
7 of Datta and Dave's analysis are completely
8 different. So there -- there would be no
9 point in comparing those results.

10 They are trying to ascertain
11 the extent to which detailing across
12 physicians drives marketing impact, so
13 they're really interested in questions like,
14 you know, what -- how -- how much does it
15 make sense for a company to detail high
16 prescribers versus low prescribers to a
17 greater degree.

18 I'm interested in the aggregate
19 impact, and so that is what my model does
20 best. Their model would not be appropriate
21 for ascertaining the aggregate impact.

22 BY MR. ROTH:

23 Q. I understand you're interested
24 in the aggregate impact, but if one were
25 interested in the individual impact of any

1 single manufacturer's detailing, you could
2 run an analysis similar to Datta and Dave
3 using whatever data were available for that
4 manufacturer?

5 MR. SOBOL: Objection.

6 A. There are two levels of
7 aggregation here. One is from the doctors up
8 to the total product level, and the other is
9 from the product to the defendant to the
10 whole class, if I can use that term to
11 describe all the opioids that we're
12 interested in here.

13 So Datta and Dave are at the
14 most granular level, the individual doctor
15 prescribing for an individual drug.

16 I am interested in
17 understanding how marketing as a whole drove
18 sales in this market and I want to capture
19 all of the spillover effects. They're trying
20 to tease out other kinds of effects.

21 This analysis could not be used
22 to get an answer to the question what would
23 have happened if these manufacturers had not
24 marketed their products.

25 ///

1 BY MR. ROTH:

2 Q. And the reason you're
3 interested in the aggregate question is that
4 was the charge you were given by plaintiffs'
5 counsel was to look at the aggregate impact
6 as opposed to an individual
7 defendant-specific impact?

8 A. Well, again, there are multiple
9 levels of aggregation here, so if I -- my
10 model, as you know, can be used to parse out
11 individual defendants as I have done in
12 Table 3 of my report, so it can look at an
13 individual defendant, and I've shown you
14 results excluding individual defendants. So
15 it is already doing that.

16 It's the cross-sectional nature
17 of what they're modeling here with the
18 physician-fixed effects. They're really
19 trying to tease apart how manufacturers go
20 about targeting doctors for marketing and
21 what effect that has.

22 I'm not interested in that
23 effect, and so it wouldn't be appropriate
24 even if I were only looking for one
25 defendant.

1 Q. So you're not interested in
2 trying to ascertain how manufacturers'
3 targeting for marketing has an effect.

4 What is the question you're
5 seeking to answer?

6 MR. SOBOL: Objection.

7 A. The question that I'm seeking
8 to answer is what is the effect of marketing
9 by defendants for opioid products on their
10 sales, and if that effect --

11 BY MR. ROTH:

12 Q. I'm sorry to stop you. At an
13 aggregate level, I assume you mean?

14 A. At an aggregate level. Again,
15 my model can look -- pull out the effect for
16 individual defendants, but at an aggregate
17 level.

18 And so all I'm saying is that
19 if that effect comes because one manufacturer
20 targets just the high prescribers and is very
21 effective there and another manufacturer
22 details everybody, that is not relevant to
23 what I have been asked to undertake in this
24 case, and so I don't go into the level of --
25 the physician level the way Datta and Dave do

1 because it's -- it's not relevant to my
2 conclusions.

3 Q. Have you tried, for any of the
4 individual manufacturers for which you have
5 specific data, to pressure test your
6 conclusions in Table 3, from removing them
7 from the aggregate data to see if those hold?

8 MR. SOBOL: Objection, form.

9 A. Can you repeat? Because I just
10 want to make sure I understand the question
11 you're asking.

12 BY MR. ROTH:

13 Q. Yeah. So as I understand your
14 model -- and again, we will get into the
15 details, I promise -- but you essentially
16 back out from the aggregate model individual
17 defendants, and you present those in Table 3.

18 MR. SOBOL: Objection.

19 A. That's correct.

20 BY MR. ROTH:

21 Q. So my question is: Have you
22 run a Datta and Dave type of analysis for any
23 of the individual manufacturers listed in
24 Table 3 to compare how the aggregate results
25 in Table 3 hold compared against the Datta

1 and Dave type analysis we've been discussing?

2 MR. SOBOL: Objection, asked

3 and answered.

4 A. I think, again, you

5 misunderstand what the utility of the Datta

6 and Dave analysis is. It is an analysis that

7 is designed to dig into how marketing works

8 and not whether.

9 There would be no utility in

10 comparing results of a Datta and Dave

11 analysis, if one were possible, with my

12 aggregate results because the questions

13 they're looking at are entirely different.

14 BY MR. ROTH:

15 Q. And why is the question you

16 answer only about how marketing works as

17 opposed to whether?

18 A. No. Sorry. Their how.

19 Q. Okay. Why is -- So how are you

20 answering the question through your aggregate

21 model whether marketing works if you're not

22 looking at it on an individualized

23 doctor-specific level?

24 MR. SOBOL: Objection.

25 A. My analysis is a model of the

1 effect of detailing as a whole for this
2 class, its effect on sales in the form of
3 milligrams of morphine equivalent, just to be
4 clear.

5 So my right-hand side variable
6 is detailing. My left-hand side variable is
7 MMEs. Datta and Dave -- so that tells me, if
8 marketing increases in this area as a whole,
9 what happens to MMEs? That's the question
10 that relates to my assignment.

11 Datta and Dave are asking, you
12 know, can we examine and tease out to what
13 extent manufacturers target specific types of
14 physicians and whether the prescribing of
15 physicians is more driven by this targeting
16 question or by the marketing effectiveness.

17 They're doing so on a very
18 short time period in the scheme of things,
19 right? So two years of data doesn't --
20 doesn't allow them to look, for example, at
21 what happened before that two-year time
22 period in terms of the buildup of knowledge
23 about these products, all of those things
24 that are captured in the stock of detailing
25 that I use.

1 And so they have this
2 interesting work that tells us something
3 about responsiveness of physicians, but it
4 doesn't get us to the aggregate question
5 about how -- to what extent does marketing
6 across all of their drugs affect the size of
7 the market.

8 BY MR. ROTH:

9 Q. What have you done to answer
10 the individualized question of whether
11 targeting certain physicians by the
12 manufacturers in this case was the cause of
13 additional MMEs as opposed to the
14 effectiveness of the marketing overall?

15 MR. SOBOL: Objection.

16 A. That question is not relevant
17 to my charge. I want to understand what is
18 the total effect. I have -- I do not know
19 why the court would want to understand what
20 aspects of the targeting of specific
21 physicians that drive marketing increases.

22 BY MR. ROTH:

23 Q. What have you done to answer
24 the individualized question of whether
25 certain messaging by individual manufacturers

1 led to an increase in MMEs?

2 MR. SOBOL: Objection.

3 A. As we have discussed, I am
4 taking an assumption from counsel, as experts
5 always do, that they will prove their case,
6 and specifically, the relevant assumption I
7 have made is that all or virtually all
8 marketing by defendants from 1995 to the end
9 of my data was unlawful.

10 I have reviewed documents and
11 other expert reports. I have not parsed out
12 individual messages and in any way parsed out
13 the marketing that I assume to be unlawful in
14 my model to differentiate from one to
15 another.

16 BY MR. ROTH:

17 Q. Do you agree that standards of
18 care influence prescribing decisions?

19 A. What -- do you mean by
20 standards of care something very general or
21 do you mean that in the sort of the
22 negligence sense, since you're a lawyer?

23 Q. That's fair. You've done this
24 a lot because you went somewhere that I
25 wasn't going.

1 I meant the more general. Do
2 you agree that sort of the prescribing and
3 treatment standards of care can influence
4 prescribing decisions?

5 A. Again, I would say if we looked
6 at my ecosystem, I don't know that I call out
7 standards of care specifically, but if those,
8 for example, are set in part by what your
9 peers are doing, if those are set in part by
10 professional guidelines, then, yes, I believe
11 that those are relevant determinants of
12 physician behavior.

13 And as I said earlier, I also
14 believe that those would be affected by the
15 alleged misconduct.

16 Q. Although detailing is not the
17 same as affecting the standards of care,
18 right? Those are two different marketing
19 channels?

20 A. It's not clear to me that
21 detailing would not affect the standards of
22 care. Detailing could, for example, try to
23 convince individual physicians that it's okay
24 to prescribe opioids more broadly by citing
25 guidelines, by citing peers and key opinion

1 leaders. So I think it could well be wrapped
2 up. I don't know why they'd be independent.

3 Q. Do you agree that patient
4 preference can affect a physician's
5 prescribing decision?

6 A. Yes, of course patient
7 preference can affect a physician's
8 prescribing decision.

9 Q. Loyalty to certain drugs can
10 affect a physician's prescribing decision?

11 A. Physicians -- it has been found
12 in the literature that physicians have a
13 tendency to prescribe a particular drug once
14 they've gotten used to it, so in the
15 antidepressant class, for example, that's
16 been shown.

17 Q. Drug reimbursement policy can
18 affect physician's prescribing decisions?

19 MR. SOBOL: Objection.

20 A. Yes, all of these factors, the
21 last two factors, I would say they're most
22 likely to affect physician prescribing
23 patterns by the specific brand or brand -- in
24 the case of reimbursement, brand versus
25 generic as opposed to whether the physician

1 prescribes an opioid.

2 BY MR. ROTH:

3 Q. And we'll get to this later,
4 but to the extent you're looking at detailing
5 visits, you don't differentiate between
6 detailing visits that are just driving at
7 rivalrous marketing to get a prescriber to
8 switch opioids versus detailing visits that
9 are trying to get doctors to prescribe
10 opioids as a class of therapy?

11 A. I don't differentiate on the
12 right-hand side, and so if, in fact,
13 detailing was all rivalrous, my results would
14 show that marketing doesn't affect sales. So
15 that is the point of the analysis, is to
16 ascertain.

17 So you could imagine doing an
18 analysis in a market that has a fixed size,
19 where all marketing is rivalrous, and there's
20 some discussion for other drugs where
21 marketing appears to be more about market
22 share and not about driving the size of the
23 market as a whole.

24 But, in fact, my analysis shows
25 that the market expansion effects were

1 important, whether or not there was also
2 rivalry.

3 Q. You agree, though, that if a
4 manufacturer was only engaged in rivalrous
5 marketing, for example, that would be
6 qualitatively different than trying to make
7 the market and convince prescribers to move
8 patients on to opioids?

9 A. I don't believe in the
10 conceptual premise that you have just put
11 forth that there's such a thing as purely
12 rivalrous marketing, in the case where the
13 market is not fixed by some reason.

14 So even if, you know, I go and
15 I market for Coke and it's not that I'm
16 trying to get you to drink more
17 sugar-sweetened beverages, I just want you to
18 stop drinking Pepsi, that will still remind
19 some people that, oh, yeah, I should think
20 about having a Coke this afternoon instead of
21 my usual coffee.

22 So I think there will be
23 market-increasing spillovers even from purely
24 rivalrous marketing.

25 Q. The economic literature doesn't

1 agree with you on that, though?

2 A. I'm not sure that that's true.

3 Q. We'll look at it.

4 A doctor's own medical judgment
5 can affect prescribing decisions?

6 A. I think it would be very
7 difficult to say that that was not true.

8 Q. And in fact, I think Professor
9 Cutler has got a working paper where he draws
10 that conclusion. Have you studied that or
11 read that paper?

12 A. You'd have to put it in front
13 of me.

14 Q. We can look at it quickly.

15 (Whereupon, Deposition Exhibit
16 Rosenthal-6, 2015 Cutler et al Working
17 Paper, was marked for identification.)

18 BY MR. ROTH:

19 Q. So I'll mark as Exhibit 6
20 Physician Beliefs and Patient Preferences: A
21 New Look at Regional Variation in Health Care
22 Spending.

23 And if you look at page 5, do
24 you see in the middle of the page there's a
25 paragraph that starts with "Ultimately"?

1 A. Uh-huh.

2 Q. He says --

3 MR. SOBOL: Wait, is this an
4 excerpt or is this the whole article?

5 THE WITNESS: It's an excerpt.

6 MR. ROTH: It's an excerpt.

7 It's an excerpt.

8 A. I just want to just review the
9 front piece so I can --

10 BY MR. ROTH:

11 Q. Sure.

12 A. -- understand what it's about.
13 (Document review.)

14 A. Okay.

15 BY MR. ROTH:

16 Q. So in the paragraph I was
17 pointing you to, it says: Ultimately, the
18 largest degree of residual variation appears
19 to be explained by differences in physician
20 beliefs about the efficacy of particular
21 therapies. Physicians in our data have
22 starkly different views about how to treat
23 the same patients. These views are not
24 strongly correlated with demographics,
25 financial incentives, background or practice

1 characteristics and are often inconsistent
2 with evidence-based professional guidelines
3 for appropriate care.

4 Do you see that?

5 A. Yes, I do.

6 Q. And do you have any reason to
7 believe that is not true of physicians when
8 they prescribe opioids?

9 MR. SOBOL: Objection.

10 A. Well, just to be clear, the
11 context that they're looking at is not one
12 that's subject to marketing, but in any case,
13 there's no presumption here that those
14 beliefs are not set by some other factors,
15 right.

16 So they're -- they're --
17 they're trying to identify all the forces
18 that they can measure, including financial
19 incentives and other characteristics, and so
20 they're putting in beliefs everything else.

21 But that's not to say that
22 those beliefs couldn't be shaped by
23 marketing. So I think it would be a mistake
24 to consider beliefs as independent. I
25 wouldn't say that they're a hundred percent

1 set by marketing, but they're clearly
2 influenced by marketing. That's really the
3 issue at hand here.

4 BY MR. ROTH:

5 Q. Are there physicians in the
6 world who don't allow detailing in their
7 offices?

8 MR. SOBOL: Objection.

9 A. Yes. But again, I think
10 conceptually, that's the wrong way to look at
11 this, as I have noted in my report, that even
12 if you never have someone detail you,
13 you're -- you're connected with peers, you
14 are getting messages through professional
15 societies.

16 It would be hard to imagine a
17 physician who's completely untouched by the
18 alleged misconduct in this matter.

19 BY MR. ROTH:

20 Q. Do you agree that
21 characteristics of individual patients can
22 obviously affect prescribing decisions?

23 A. Yes. I would hope that
24 physician characteristics matter to -- sorry,
25 patient characteristics matter to physicians

1 when they're prescribing.

2 Q. And then you also mentioned
3 this earlier, but risk aversion or potential
4 medical malpractice liability could also
5 influence prescribing decisions?

6 A. That is possible. That is
7 possible, and I believe that is part of what
8 the model guidelines for state medical boards
9 is intended to address.

10 Q. Okay. And just so I understand
11 your position on this, do you believe there
12 are aspects of a doctor's prescribing
13 decision that are unaffected by marketing, or
14 is it your view that marketing infiltrates
15 everything in their mind at the time they
16 decide to prescribe a product like a
17 prescription opioid?

18 MR. SOBOL: Objection.

19 A. I don't know exactly what you
20 mean by that, but I can tell you what I
21 believe. I believe that modern
22 pharmaceutical marketing, including the
23 tactics that are described in the complaint
24 in this matter, is comprehensive and
25 ubiquitous.

1 Does that mean it is strictly
2 determinative of what every physician does
3 for every patient? No, I do not believe
4 that. I do believe that marketing, it can't
5 be teased out in terms of looking just at
6 what physicians were detailed, but it has an
7 influence that is quite broad.

8 Other factors will certainly be
9 important, but the question here is really
10 what is the incremental effect of marketing
11 on the prescriptions that physicians write.
12 BY MR. ROTH:

13 Q. Have you reviewed the facts of
14 any prescription by a doctor of an opioid in
15 this case?

16 A. I don't think so, no.

17 Q. And you don't know how, on an
18 individual level, a specific doctor was
19 affected by a detailing visit in your model
20 because you haven't done that analysis?

21 A. I have not looked at individual
22 physician-level data as we discussed, and I
23 do not believe it is the most appropriate
24 path to fulfilling my assignment.

25 Q. Okay. And your model does not

1 attribute any percentage of causality to
2 prescribing doctors for the increased volume
3 of MMEs that you calculate?

4 MR. SOBOL: Objection, asked
5 and answered.

6 A. As we've discussed earlier,
7 that notion, just conceptually, I struggle
8 with the idea that you're asking me to
9 consider. Every prescription in my data was
10 written by a physician.

11 BY MR. ROTH:

12 Q. Right. But I asked a little
13 bit of a different question.

14 You don't have a percentage
15 line in your report for doctors the way you
16 do in Table 3?

17 MR. SOBOL: Objection, asked
18 and answered.

19 A. Well, again, just that would
20 make no sense to me, so the marketing in
21 question operates through doctors.

22 MR. ROTH: Why don't we take a
23 five-minute break.

24 MR. SOBOL: Okay.

25 THE VIDEOGRAPHER: The time is

1 9:31 a.m. We're now off the record.

2 (Recess taken, 9:31 a.m. to

3 9:46 a.m.)

4 THE VIDEOGRAPHER: The time is

5 9:46 a.m. We're back on the record.

6 BY MR. ROTH:

7 Q. Professor Rosenthal, if you
8 could turn to page 13 of your report,
9 paragraph 16, and tell me when you're there.

10 A. Yes.

11 Q. You've got a heading, The Role
12 of Public and Private Health Insurance.

13 Do you see that?

14 A. Yes.

15 Q. And you say in paragraph 16:
16 Another distinguishing feature of
17 pharmaceutical demand is the widespread
18 presence of insurance coverage. As of 2017,
19 approximately 88% of nonelderly adults have
20 insurance coverage through a private or
21 public health insurance plan.

22 Do you see that?

23 A. I do.

24 Q. And then you go on to talk
25 about the Affordable Care Act and then you

1 say: Insurance coverage among the elderly is
2 virtually universal, and among those enrolled
3 in Medicare, the vast majority have
4 prescription drug coverage either through
5 Medicare Part D or retiree plan.

6 Do you see that?

7 A. Yes.

8 Q. We talked about this a little
9 bit earlier, but are you aware of pharmacy
10 benefit managers?

11 A. Yes, I am.

12 Q. What are they?

13 A. Pharmacy benefit managers are
14 essentially specialty health insurers. They
15 manage only the pharmaceutical part of the
16 health benefit, and they typically contract
17 either with a primary health insurer or a
18 self-insured employer.

19 Q. And what role do they play in
20 providing insurance coverage or approving
21 prescriptions of opioids?

22 A. Pharmacy benefit managers, they
23 have pharmacy networks, so they negotiate
24 contracts with pharmacies. They adjudicate
25 claims electronically. They typically define

1 formularies, so which drugs are covered, and
2 they offer employers and health plans
3 alternative copayment structures. So those
4 are their main roles.

5 Q. And you just mentioned
6 formularies. How would you define what a
7 formulary is?

8 A. A formulary is a list of
9 covered drugs. An open formulary means that
10 the list is preferred drugs, but other drugs
11 are still eligible for reimbursement. A
12 closed formulary is a list of drugs that are
13 exclusively covered by a health plan.

14 Q. Given the pervasiveness of
15 insurance and the role that PBMs and
16 formularies play, what analysis did you
17 perform on the role of insurers in assessing
18 the volume of MMEs in your models?

19 A. Well, if I understand you
20 correctly, I think we have a very similar
21 situation conceptually to the one we talked
22 about earlier with physicians, not a hundred
23 percent the same.

24 But PBMs and health insurers
25 adjudicate and pay for claims associated with

1 opioid prescriptions. There is a small
2 percentage of consumers that pays for their
3 own prescription drugs. It varies from drug
4 class to drug class, but perhaps 5 or 10% of
5 individuals pay out of pocket, and therefore
6 PBMs and health insurers have no role, but in
7 the context of insured patients, the insurer
8 is on the causal chain between the sales data
9 we see and the marketing I measure.

10 Q. And did you do any analysis as
11 to how the insurer influences the MMEs
12 ultimately prescribed through their role in
13 the causal chain?

14 MR. SOBOL: Objection, asked
15 and answered.

16 A. Like many of the individual
17 factors we talked about when it comes to
18 patient characteristics and physician
19 characteristics, characteristics of the
20 health insurance coverage are included in my
21 analysis implicitly but not explicitly.

22 Because my analysis is
23 concerned with looking at these aggregate
24 trends, there's not an appropriate place to
25 look at the variation in health benefits, as

1 I believe I think you're asking.

2 BY MR. ROTH:

3 Q. Did you study how insurance
4 coverage for prescription opioids compares to
5 substitutes or alternatives for the
6 conditions prescription opioids are
7 prescribed for?

8 MR. SOBOL: Objection.

9 MR. ROTH: Let me rephrase the
10 question because that came out
11 muddled.

12 BY MR. ROTH:

13 Q. Did you study how insurance
14 coverage for prescription opioids compares to
15 insurance coverage for their substitutes?

16 MR. SOBOL: Objection.

17 A. I did not study individual
18 benefit designs for opioids, and I am not a
19 hundred percent sure I know where you're
20 going with that question, but if you're
21 asking about physical therapy, for example, I
22 did not look at coverage.

23 Again, in the context of my
24 analysis, if, for example, there were
25 differences in coverage for opioids versus

1 physical therapy, that would affect the level
2 of sales. It would not be correlated with
3 and therefore confound the effect of
4 marketing.

5 BY MR. ROTH:

6 Q. Okay. Talking about physical
7 therapy, nonsteroidal antiinflammatory drugs,
8 other things that could be used to treat the
9 same things as opioids, so we're on the same
10 page.

11 A. Okay. When you say "things,"
12 do you mean pain?

13 Q. Pain -- primarily, yeah, pain,
14 I would say.

15 MR. SOBOL: Why don't we start
16 again.

17 MR. ROTH: Okay.

18 BY MR. ROTH:

19 Q. I'm talking about substitutes
20 that could be used to treat pain other than
21 prescription opioids, including your example
22 of physical therapy, nonsteroidal
23 antiinflammatory drugs and other such
24 therapies, okay?

25 A. Okay.

1 Q. And just so we have a clean
2 transcript, you have not studied how
3 insurance coverage for prescription opioids
4 compares to insurance coverage for substitute
5 therapies for the treatment of pain?

6 A. I have not studied that because
7 it is not appropriately captured in the
8 analysis that I do, no.

9 Q. Do you agree that insurers will
10 sometimes create formularies to pursue less
11 costly therapies?

12 A. Yes, I would say the
13 formularies are typically designed to balance
14 affordability and accessibility of effective
15 treatment. So costs are one of the
16 considerations in creating a formulary.

17 Q. And to the extent formularies
18 prefer prescription opioids because they cost
19 less than other therapies, that might drive
20 consumption of prescription opioids?

21 MR. SOBOL: Objection.

22 A. I'm just -- I just want to
23 understand, make sure I understand the
24 question.

25 If formularies had more

1 generous coverage for opioids than some
2 alternative pain therapy, that that might
3 again -- it might affect the level of sales
4 of opioids relative to other pain therapies.

5 It would not -- that difference
6 would not be correlated with the intensity of
7 marketing in a given period, and therefore,
8 it would not be confused with the effect of
9 marketing.

10 So I think it's really
11 important that we get very clear that there
12 are factors, such as patient characteristics,
13 such as these formulary differences that will
14 affect in a cross-sectional way the
15 difference between whether I get opioids and
16 whether you get opioids, the use of opioids.

17 But that does not mean that
18 they will affect opioid sales over time or,
19 more specifically, in a way that's correlated
20 with marketing, and therefore, would confound
21 my estimates.

22 BY MR. ROTH:

23 Q. How do you know that those
24 issues would not affect opioid sales over
25 time or be correlated with marketing?

1 A. Well, a couple of things. One,
2 we do know from the research of others that
3 insurance expansion does not appear to have
4 caused increased opioid prescribing, so that,
5 as a high-level matter, suggests that these
6 factors are not important.

7 The -- we also know from
8 looking at detailing that, you know, clearly,
9 aggregate detailing in this market has been
10 substantial over these particular time
11 periods, leading to a stock of detailing that
12 I'm sure we'll look at, but is visually
13 depicted in my report.

14 The cross-sectional variation
15 in the generosity of coverage for particular
16 drugs is a phenomenon that just could not be
17 correlated with those marketing increases
18 over time.

19 Q. You say it's a phenomenon that
20 could not be correlated, but you did not
21 include variation in the generosity of
22 coverage as an independent variable in either
23 of your models, correct?

24 A. It is not included in my model,
25 no, and again, I do not believe it's

1 appropriate to include in there.

2 Q. So you didn't test it as a
3 variable to confirm your presumption based on
4 your model's output that it wasn't
5 correlated?

6 MR. SOBOL: Objection, form,
7 asked and answered.

8 A. You've created this
9 hypothetical about differences in formulary
10 coverage. When you say you didn't test it as
11 a variable, I don't think that's a variable
12 exactly. I'm not sure how one would measure
13 the relative coverage generosity, so I have
14 not looked at that, no.

15 BY MR. ROTH:

16 Q. You said there's literature
17 saying that insurance expansion did not cause
18 increased opioid prescriptions. What are you
19 thinking of?

20 A. There's a paper by Brendan
21 Saloner. I believe it's cited in my report,
22 but I'm just going to look at my Documents
23 Relied on. It does not appear to be there.

24 Q. So it's something you reviewed
25 outside of the context of this case that is

1 not on your Attachment B or cited in your
2 report?

3 A. Yes. I didn't rely on it in my
4 analysis, but I -- it's a paper that I've
5 reviewed. Brendan Saloner happens to be a
6 student of ours from Harvard and, in general,
7 I try to keep up with the literature in areas
8 that I'm interested in.

9 Q. Because it wasn't disclosed in
10 your report, I haven't seen it yet, but I'll
11 look at it between now and the end of your
12 deposition and we can talk about it.

13 A. Yes.

14 Q. If you look at --

15 MR. SOBOL: Do you have a
16 spelling on the last name then?

17 A. S-A-L-O-N-E-R.

18 BY MR. ROTH:

19 Q. And do you know what kind of
20 study it was or the title or the date? Any
21 identifying information would be helpful.

22 A. It would have been in the last
23 couple of years, and, yes, I don't -- I think
24 it would have had the Affordable Care Act in
25 its name.

1 Q. Okay. But you do agree that if
2 there is insurance coverage for opioids, that
3 could lead to more utilization of opioids?

4 A. I guess I believe that
5 insurance coverage at some level has an
6 effect on sales, and -- and that -- that
7 effect is captured in the aggregate sales
8 data.

9 So to the extent that coverage
10 for some people was less generous, sales are
11 lower, so that's captured in the data. And
12 like other factors, my model uses, for
13 example, changes in prices. It uses the
14 specific eras that I have delineated that
15 show the environment in which marketing was
16 generating sales changed. Health insurance
17 might be part of that change.

18 And so I believe that this fact
19 is appropriately captured in my model. The
20 cross-sectional variation that you're talking
21 about, differences among people, that does
22 not belong in an aggregate time series model.

23 Q. Do you agree that there is
24 price sensitivity with respect to the
25 prescription and consumption of prescription

1 opioids?

2 MR. SOBOL: Objection.

3 A. Well, I think there are two
4 parts to what you just asked, and I'm a
5 health economist, so I won't say I don't
6 believe in price sensitivity.

7 As you may know, healthcare is
8 less sensitive to prices than other goods,
9 and I describe the reasons why that is true
10 in my report. But consumers do respond to
11 the out-of-pocket cost, and that may again
12 mean that people are more likely to use a
13 generic if one is available. It may affect
14 the level -- the extent to which people fill
15 prescriptions at all. So there may be an
16 effect on aggregate sales.

17 I would expect on the patient
18 side it would have an effect on which opioid
19 they would use more likely than whether.

20 On the physician side, which I
21 thought was implicit in the way you framed
22 the question, it's not at all clear that
23 physicians are price sensitive. They
24 frequently lack information on things like
25 benefit design, and I address that in my

1 report, is that one of the challenges in this
2 market is that physicians are making the
3 decisions and they are neither financially
4 responsible for nor them generally aware
5 about prices.

6 BY MR. ROTH:

7 Q. No, that's helpful.

8 If you look at paragraph 17,
9 the reason I asked the question is you say:
10 The lack of price sensitivity on the part of
11 physicians and patients due to insurance has
12 had two important consequences.

13 If I understand your testimony,
14 really, we should focus on the physicians
15 more than the patients. Patients may, in
16 fact, be price sensitive.

17 A. So when I'm using the term
18 there -- and thank you for pointing me to
19 that -- I'm really talking about the total
20 price of the drug. And so generally, because
21 patients have insurance, they see a small
22 copayment, and so those copayment -- they may
23 be sensitive to those copayments, which are
24 the relevant price at the pharmacy for an
25 insured consumer, but they're not sensitive

1 to the total price of the drugs.

2 Q. Well, they're sensitive to
3 whether it's covered by insurance or not in
4 the first instance, though.

5 A. Yes. I mean, I would think
6 about that as a continuous thing, right.
7 Coverage is a function of whether, but also
8 the generosity of coverage.

9 Q. Yeah. Just to give you a
10 concrete example, so Mrs. Smith goes to the
11 doctor for back pain and he says you could do
12 occupational therapy with Dr. Jones down the
13 street for six months and try that out, or I
14 can write you a prescription for hydrocodone.
15 One is covered, one is not. She's going to
16 prefer the covered choice, I would think, as
17 a consumer.

18 A. Well, that's not how I would
19 approach that question as an economist, but,
20 you know, I would say that the out-of-pocket
21 cost of those alternatives is one factor, and
22 there are other kinds of costs and benefits.

23 Q. All things being equal, if
24 she's solely driven by the price tag, she's
25 going to prefer the covered therapy as

1 opposed to the uncovered therapy, recognizing
2 as you did that there may be other reasons
3 why she might have a preference?

4 A. Such as addiction risk and the
5 like. I think the out-of-pocket cost will be
6 relevant to that decision.

7 Q. I promise we're almost to your
8 models. Just one more general area first.

9 Your direct model is based on
10 national data with respect to detailing,
11 correct?

12 A. Yes, it is.

13 Q. And nationwide data with
14 respect to MMEs dispensed as well?

15 A. Yes, it is.

16 Q. Your indirect model is based on
17 the ARCOS data, which you describe as county
18 level, and we can talk about that later; is
19 that right?

20 A. Yes.

21 Q. Okay. That was a terrible
22 question.

23 So your indirect model is based
24 on the ARCOS data, which is then subdivided
25 into county-level data.

1 A. It is. I guess when you say
2 subdivided, I think it comes that way, but
3 yes, right.

4 Q. And your indirect model does
5 not have a detailing variable because you're
6 essentially solving for marketing by
7 including other variables in that approach?

8 A. Yes. The purpose of the
9 indirect model is to go another way around
10 and ignore the detailing data.

11 Q. If you take out -- put another
12 way, if you take out everything else that
13 would be relevant, what is left is detailing
14 in the indirect model?

15 A. Yes.

16 Q. Okay. So the only model with
17 detailing data is the direct model, and for
18 that you use national data?

19 A. That's correct.

20 Q. So you don't have any model
21 that measures the effect of detailing within
22 either Summit or Cuyahoga County?

23 MR. SOBOL: Objection.

24 A. My model looks at detailing as
25 a national phenomenon, which as I note in my

1 report, detailing is generally a national
2 phenomenon.

3 And I take the relationship
4 between detailing and sales, and I apply it
5 to Summit and Cuyahoga, or it ultimately gets
6 applied downstream rather, but I do not have
7 detailing at a level other than national and
8 so cannot run a model at a lower level of
9 geography.

10 It's my belief that these
11 patterns are the same across the country, and
12 I believe there's some testimony to that
13 effect.

14 BY MR. ROTH:

15 Q. So you did not model marketing
16 within either Summit or Cuyahoga County
17 against MMEs within Summit or Cuyahoga
18 County?

19 A. As we've discussed, my model
20 looks at these relationships at a national
21 level because that is really the level at
22 which manufacturers set their strategy and
23 the appropriate level to look at the
24 effectiveness of marketing.

25 Q. Do you know how many of the

1 detailing visits in your data occurred in
2 Summit County or Cuyahoga County?

3 A. In the IMS -- or, rather,
4 excuse me, the IQVIA data specifically, there
5 is not a method for apportioning those from
6 county to county.

7 Q. Did you do any analysis as to
8 whether the impact of defendants' marketing
9 varied by county, or was it not done because
10 you assumed it was national in scope?

11 MR. SOBOL: Objection.

12 A. I believe that is appropriate
13 to assume that the effectiveness, the
14 relationship between marketing and sales is
15 the same across counties, and -- and again,
16 my data do not allow me to parse out
17 detailing at a county level.

18 So where -- where it is
19 possible to parse out sales at a county
20 level, it is not possible to do so for
21 detailing. So I did not test that.

22 BY MR. ROTH:

23 Q. Okay. Professor Cutler takes
24 your percentage, though, and applies it to
25 his regression, which is done at a county

1 level; is that right?

2 MR. SOBOL: Objection.

3 A. Professor Cutler's
4 calculations, once he has looked at the
5 effect of shipments on harms, he then applies
6 my percentage to that, yes.

7 BY MR. ROTH:

8 Q. Did you have any conversations
9 with Professor Cutler about the fact that he
10 was taking your national model and then
11 applying it to his county model and what that
12 might mean for his results?

13 MR. SOBOL: That's a yes or a
14 no.

15 A. Yes.

16 BY MR. ROTH:

17 Q. Did you have any of those
18 conversations outside of the presence of
19 counsel?

20 A. No.

21 Q. Do you have any view about the
22 propriety of taking a national model as
23 you've done and then inputting that into a
24 county-specific model as Professor Cutler has
25 done?

1 A. Yes. I believe the national
2 model is appropriate. Again, because
3 marketing strategy is a national phenomenon,
4 the national data are a reliable way to
5 ascertain the relationship between marketing
6 and sales.

7 I have used the same
8 methodology, for example, in the Neurontin
9 matter concerning Kaiser. We used a national
10 model to estimate the relationship between
11 marketing and sales and applied that to a
12 single healthcare system.

13 Q. So if marketing is, in your
14 view, nationally done and substantially
15 similar, why is there a difference in
16 shipments on a county level the way Professor
17 Cutler's modeled it?

18 MR. SOBOL: Objection, scope.

19 A. This of course is the subject
20 of Professor Cutler's report, and I -- I'm
21 not sure as I sit here I could tell you
22 exactly the factors, but it is obviously
23 counties are situated differently in ways
24 that he captures in his cross-sectional model
25 of harms that could absolutely affect the

1 shipments in that county, conditional on
2 marketing.

3 BY MR. ROTH:

4 Q. Put another way, though, you
5 would not expect differences in shipments
6 across counties to be caused by marketing
7 where you presume all marketing is national
8 in scope?

9 MR. SOBOL: Objection.

10 A. I don't believe that that's the
11 right way of looking at it. So if there's a
12 specific relationship between marketing and
13 sales and -- it could well be that counties
14 start at different levels of use, and so the
15 incremental effect of those relationships, as
16 you see in Professor Cutler's analysis,
17 materializes differently in those counties.

18 That doesn't mean the effect of
19 marketing was different. It's just the
20 baseline was different.

21 BY MR. ROTH:

22 Q. But I think you said that's an
23 issue you would defer to Professor Cutler.
24 You don't have an opinion on how your
25 national model plugs into his county model

1 and why the differences may occur in
2 shipments?

3 MR. SOBOL: Objection.

4 A. It's my opinion that it's
5 appropriate to take my national estimates.
6 National-level analysis is the most robust
7 analysis. It's the place where the data are
8 really reliable. I think it's appropriate
9 for Professor Cutler to use those estimates
10 in the way that he has.

11 BY MR. ROTH:

12 Q. But you have no opinion that
13 explains why we may be seeing variation
14 between county-level shipments in his model
15 despite him using your national model on
16 marketing?

17 MR. SOBOL: Objection, asked
18 and answered.

19 A. I do not have an opinion
20 specifically on that, no.

21 BY MR. ROTH:

22 Q. You do not attempt to link any
23 specific prescription to any specific
24 defendant's marketing; is that fair?

25 A. Are you asking me whether I'm

1 looking prescription by prescription, these
2 ones were caused and those ones were not?
3 The analysis -- the but-for analysis is a
4 world that did not occur, of course. Would
5 you agree?

6 The but-for world where the
7 marketing didn't happen, didn't happen. So
8 my analysis can tell me about the correct
9 aggregate amount. It does not identify one
10 prescription at a time.

11 Q. Okay. Yeah. Just so the
12 record is clear, we've been through this, but
13 you did an aggregate model. You didn't build
14 it from the ground up on a
15 prescription-by-prescription,
16 detail-by-detail basis?

17 MR. SOBOL: Objection.

18 A. Right. If I may, the -- I did
19 an aggregate model. The aggregate sales of
20 course are the sum of individual
21 prescriptions, but I am looking at the
22 national level at total marketing on total
23 sales.

24 It's not that it's unknowable
25 what those prescriptions were underneath the

1 sales data. That's not the -- that's not the
2 challenge. The challenge is a conceptual
3 one.

4 The but-for scenario didn't
5 happen, so I cannot say precisely which
6 prescriptions would not have been written,
7 only that there is some group of them.

8 BY MR. ROTH:

9 Q. I know you said earlier you
10 looked for manufacturer-specific detailing
11 notes and marketing information. Did you
12 find or learn of any manufacturer-produced
13 data on detailing to specific doctors within
14 Summit or Cuyahoga County?

15 A. I don't recall.

16 Q. And it's fair to say if that
17 does exist, it's not something you reviewed
18 or relied on for Attachment B?

19 MR. SOBOL: Objection.

20 A. I did not use individual
21 physician-level data, no.

22 BY MR. ROTH:

23 Q. And individual physician-level
24 data, as you may have used in other cases,
25 would be drug specific and doctor specific,

1 correct?

2 MR. SOBOL: Objection.

3 A. Well, it depends on really what
4 you're talking about. When I have had
5 individual physician-level data in the past,
6 they are sales data. So again, I think the
7 challenge is not disaggregating the sales
8 data.

9 There are products that exist;
10 sometimes they require subpoenas to get them,
11 but there are products that exist that allow
12 us to look at prescribing at a physician
13 level, but not at detailing at a physician
14 level. So those data I have not used because
15 I have not seen them.

16 Q. Well, but, for example, an
17 individual manufacturer may keep detailed
18 call notes of the doctor visits that their
19 sales representatives engage in, correct?

20 A. Well, I have seen call notes in
21 the past, and I have always found them to be
22 unusable.

23 Q. And why is that, out of
24 curiosity?

25 A. They often do not include

1 provider identifiers, so they can't be linked
2 to other data. They are incomplete, and
3 they -- they are often produced -- so
4 incomplete in the sense of the call notes
5 have a lot of blank fields, and they're often
6 produced for short time periods.

7 Q. But you didn't look at any
8 individual manufacturer call notes in this
9 case in conjunction with your expert report
10 or opinions?

11 A. I looked to see if there was a
12 source of complete data for -- in order to do
13 such an analysis, and my staff worked with
14 counsel to identify documents or databases
15 and did not find any.

16 Q. Pivoting back to Professor
17 Cutler for one more second. Have you worked
18 as an expert in other cases where you've only
19 modeled causation and then another expert has
20 taken that forward and put into it a damages
21 model as Professor Cutler has done here?

22 A. Yes.

23 Q. And what case was that or
24 cases, if there's more than one?

25 A. Yes. In Neurontin, I did the

1 same, in that order. In other cases I've
2 done the reverse where I've done damages and
3 someone else has done causation.

4 Q. Okay. And in Neurontin or
5 those other cases, whether you were on the
6 causation side or the damages side, have you
7 before encountered the issue you have here
8 where you have a national model and then a
9 localized model communicating with each other
10 to calculate damages?

11 MR. SOBOL: Objection.

12 A. Yes. As I noted earlier, in
13 Neurontin, I used a national model to connect
14 to damages for Kaiser.

15 BY MR. ROTH:

16 Q. And the damages -- you used a
17 national model, but what was the damages
18 model based on? What was it localized, or
19 was it also national?

20 A. It was localized. It was based
21 on Kaiser.

22 Q. Based on a single company it
23 sounds like you're saying. When you say
24 Kaiser, what do you mean?

25 A. Yes, that's right. Kaiser was

1 the plaintiff in that matter.

2 Q. Right. But that wasn't a model
3 of geography. That was a model of damages to
4 a particular company's sales, I would assume?

5 MR. SOBOL: Objection.

6 BY MR. ROTH:

7 Q. So for a typical -- an insurer,
8 right. Kaiser is an insurer? Am I right
9 about that?

10 A. Kaiser is a group health plan,
11 so it is both a delivery system and an
12 insurer, all rolled into one, and it is
13 geographically distinct.

14 So Kaiser is not like United.
15 It is not everywhere diffusely. It is
16 largely in California and the Pacific
17 Northwest with a few smaller sites elsewhere.

18 So again, those were national
19 estimates and those were connected to damage
20 calculations for a particular payer and
21 delivery system.

22 Q. And do you recall how they were
23 connected in that case? Were there any kind
24 of localization factors taken into account or
25 any way to differentiate the national level

1 marketing from where the damages were being
2 calculated?

3 A. As I sit here, I can't recall
4 all the calculations. I believe, again, I
5 produced the same kinds of but-for
6 percentages and passed those along to the
7 damage model.

8 Q. Okay. Other than the Kaiser
9 case, can you think of any other examples
10 like that one?

11 A. Not absolutely, but it wouldn't
12 surprise me if I had done something like this
13 before. I have been involved in some state
14 cases. I just can't recall.

15 Q. Okay. What is regression
16 analysis?

17 A. Regression analysis is a
18 statistical methodology that uses data to try
19 to understand the relationships among
20 variables, and in particular, to identify the
21 effects of certain explanatory variables on
22 some dependent variable of interest.

23 Q. And what is a time series
24 regression?

25 A. A time series regression is a

1 model that looks at these patterns over time,
2 so how -- how changes in these explanatory
3 variables over time explain changes in the
4 dependent variable over time.

5 Q. Your direct model in this case
6 is a time series regression?

7 A. That's correct.

8 Q. When is it appropriate to use a
9 time series regression model?

10 A. As in cases like this one where
11 there are dynamic relationships among the
12 variables of interest, and what I mean by
13 that is that marketing has an effect that is
14 path dependent. It depends on what happened
15 in the last period as well as this period.

16 Q. What are the other types of
17 regressions you could run, apart from a time
18 series regression?

19 MR. SOBOL: Objection. You
20 mean like here or like is she capable
21 of?

22 THE WITNESS: I was going to
23 ask you that question.

24 BY MR. ROTH:

25 Q. Generally in the world --

1 generally in the world, you've got a time
2 series -- so the way I think about this,
3 right, you've got regression analysis, and
4 one type of regression analysis is a time
5 series regression, okay? Are you with me so
6 far?

7 A. Okay. I'm with you.

8 Q. What are the other types of
9 regression analyses that one could perform?
10 I'm not asking specific to this case. Just
11 in the universe.

12 A. There are cross-sectional
13 regressions, panel data regressions. There's
14 machine learning.

15 Q. Okay. And what is a
16 cross-sectional regression?

17 A. A cross-sectional regression is
18 like the one we run in the indirect model,
19 which is looking at a set of observations
20 where there's no time dimension. We're just
21 looking across observations at a point in
22 time.

23 Q. That Datta and Dave article we
24 looked at, how would you classify that
25 regression they ran?

1 A. That's a panel model.

2 Q. Okay. And what --

3 A. They call it longitudinal, but
4 I would call it panel.

5 Q. And what is a longitudinal or
6 panel model, assuming those two things are
7 the same?

8 A. It has multiple observations
9 per unit of time, but also multiple units of
10 time.

11 Q. And when is it appropriate to
12 use a cross-sectional model?

13 A. Well, I think it's sort of hard
14 to say in general, but, I mean, it's hard to
15 say without being reductive. We run
16 cross-sectional models when we want to
17 understand cross-sectional relationships. So
18 there may be things like gender, for example,
19 that typically don't vary over time. I
20 should say sex doesn't vary over time.

21 So we may want to understand
22 the relationship between sex and wages. We
23 would run that cross-sectionally. That's not
24 something where we necessarily need a time
25 dimension.

1 So cross-sectional models are
2 often used for these kinds of immalleable
3 features that we're trying to understand as
4 opposed to things that can change.

5 Q. When would it be appropriate to
6 use a panel data model?

7 A. You know, in theory, you can
8 answer many of the same questions with all of
9 these models, but a panel data model allows
10 one, as we were looking at with the Datta and
11 Dave paper, allows one to understand the
12 effects of the individual units, particularly
13 in the way that they do, which is mostly by
14 looking at the variance around those
15 individual units as opposed to the
16 characteristics of the physicians, and
17 looking at decomposing that -- that variance
18 against something that's operating in a time
19 series way and being able to tease those two
20 things apart as they do.

21 Q. Did you consider running either
22 a cross-sectional model or a panel data model
23 in this case?

24 A. My belief is that an aggregate
25 time series model is the appropriate model

1 for the question at hand, so as I have done
2 in other cases, I selected the aggregate time
3 series model.

4 MR. SOBOL: You both just meant
5 on the direct side, right?

6 MR. ROTH: Correct. Good
7 clarification.

8 BY MR. ROTH:

9 Q. Why did you believe that the
10 aggregate time series model was the
11 appropriate model for your direct approach
12 for the question at hand?

13 A. Because, as I mentioned in
14 describing the general purposes of these
15 alternative types of models, the key
16 relationship I'm interested in is this
17 path-dependent relationship between marketing
18 and sales, and aggregate time series model
19 is -- zones right in on that. So that's
20 exactly what it's looking at.

21 It's not trying to understand
22 some of the mechanisms that Datta and Dave
23 are looking at. I want a model that will
24 capture this total effect as reliably as
25 possible.

1 Q. Do you agree with the statement
2 that although a time series correlation may
3 be striking, it does not necessarily
4 determine a causal effect?

5 A. With any regression model,
6 economists will need to use theory and tests
7 and judgment to determine causality. So
8 there may be time series relationships that
9 are not causal, yes, that is correct.

10 Q. And do you agree that when
11 there's a slow-moving trend in one variable
12 through time, it is very difficult to infer
13 its causal effects on another variable?

14 MR. SOBOL: Objection.

15 You can answer.

16 A. I believe that you're
17 describing again the well-known limitations
18 of any time series model, and there are ways
19 to examine those challenges.

20 So again, we first have to
21 start with an appropriate theoretical model.
22 Of course, you could put two variables that
23 trend together in a model and there's no
24 sensible relationship, and clearly that would
25 be spurious.

1 On the other hand, marketing is
2 clearly designed to increase sales, so we
3 start with the theory. And in developing the
4 model, we examine the kinds of time series
5 questions that you just raised with that
6 comment.

7 BY MR. ROTH:

8 Q. I mean, in some ways the
9 conclusion that marketing influences sales is
10 tautological, right? If you're marketing
11 correctly, you should be increasing sales.

12 MR. SOBOL: Objection.

13 You can answer.

14 A. I don't think that's
15 tautological. It is -- to an economist,
16 again, we would start with economic theory,
17 and if you take the theory of profit
18 maximization and put marketing in that
19 context, it would only make sense for
20 marketing to be undertaken if it increased
21 sales.

22 I think as a noneconomist, if
23 you grab someone on the street in Boston and
24 ask them why do companies market, they would
25 agree with that basic premise, right? So

1 that's -- that's the starting place.

2 It's not where we end the
3 discussion, but I wouldn't say it's
4 tautological. I would say it's theoretically
5 consistent.

6 BY MR. ROTH:

7 Q. As an economist, if companies
8 are rational actors, they're not going to
9 spend money on marketing if they don't have
10 some sales increase.

11 A. I would agree with that
12 statement, yes.

13 Q. What are the standard
14 diagnostic tests you perform in running time
15 series regressions?

16 A. In this model, of course, you
17 can see that we looked particularly about the
18 fit of the model over time and where -- I'm
19 picturing in my head the chart with Model A
20 on it where we had a single coefficient for
21 promotional effectiveness, and clearly we
22 were departing from the underlying data, so
23 those kinds of tests we conducted Wald tests,
24 two-dimensional Wald tests to examine the
25 appropriate turning points, and likewise,

1 because part of this time series model of
2 course is the stock of marketing and its
3 appropriate depreciation rate, we conducted
4 statistical tests around that as well.

5 Q. So you answered about this
6 model, which I want to get to.

7 A. Sure.

8 Q. But I'm talking generally when
9 you do time series models, what are the
10 standard diagnostic tests you might be
11 perform, whether or not you actually did it
12 in this case?

13 A. Right. I don't believe that
14 they're reported here, but early on in
15 looking at the data, we looked for -- we
16 looked at a Dickey-Fuller test, which is
17 basically testing for unit roots.

18 I'm thinking about the simple
19 explanation goes to what you said before
20 about two slow-moving trends and whether
21 there might be spurious correlation, and we
22 found that those concerns were not warranted
23 based on the Dickey-Fuller results.

24 MR. SOBOL: Can you spell that?

25 THE WITNESS: Dickey,

1 D-I-C-K-E-Y, dash, Fuller.

2 MR. ROTH: F-U-L-L-E-R?

3 A. Yes.

4 BY MR. ROTH:

5 Q. What is nonstationarity?

6 A. Nonstationarity relates to that
7 unit root. It has to do with the trends --
8 that these two trends are moving together.

9 Q. The mean or variance of the
10 variable is not constant over time?

11 A. It's -- again, it's related to
12 the way the variable of interest and the
13 right-hand side variable are regressing
14 together, so it has to do with the variance
15 over time.

16 Q. And why is nonstationarity an
17 issue with time series models?

18 A. If you have this problem, which
19 again, we do not, then you can get spurious
20 results.

21 Q. Do you know when your team or
22 you performed the Dickey-Fuller test?

23 A. I believe it was early on in
24 the analysis that we were doing.

25 Q. Okay. And do you have the

1 results of those tests somewhere that you
2 could produce to us?

3 A. I do not.

4 Q. And why is that? Is it a
5 computer model test that...

6 A. Generally we don't save the log
7 files for those kinds of tests.

8 Q. Okay. Could one be performed
9 using the backup data you've produced?

10 MR. SOBOL: Objection.

11 A. Yes, I believe so.

12 BY MR. ROTH:

13 Q. Do you know if the MME
14 prescriptions in your model are stationary?

15 A. As I sit here, no.

16 Q. Do you know if the stock of
17 detailing variable is stationary?

18 A. Again, as I sit here, no.

19 Q. And would the presence of
20 nonstationarity lead you to overstate the
21 impact of promotion in your direct model?

22 A. Well, again, if the -- if there
23 was a unit root problem, then it could
24 overstate the results, yes.

25 Q. And I assume because your

1 Dickey-Fuller test showed no unit root
2 problem, you did not make any effort to
3 correct for nonstationarity?

4 A. That's correct.

5 Q. What is autocorrelation?

6 A. Autocorrelation is essentially
7 when the residuals from one time period are
8 correlated with the residuals from the next
9 time period, so autocorrelation from period
10 to period.

11 Q. And autocorrelation can
12 overstate the impact of a predictor variable?

13 A. No, that's not quite correct.
14 Autocorrelation can affect the standard
15 errors. It does not bias the coefficient.

16 Q. Could the presence of
17 autocorrelation lead to an overstatement of
18 the impact of an independent variable?

19 A. No, the presence of
20 autocorrelation could lead to an
21 overstatement of the statistical significance
22 of an independent variable, but not its
23 effect.

24 Q. Did you run any tests to detect
25 autocorrelation in your direct model?

1 A. I believe there were some tests
2 for autocorrelation also early on when we
3 were beginning our work, and we found that,
4 particularly in the late period, that while
5 there was some early autocorrelation, that
6 the autocorrelation goes away in a later
7 period of the data, and we did not correct
8 for it.

9 Q. Is that a Durbin-Watson test?

10 A. I believe that is a
11 Durbin-Watson.

12 Q. Do you have the results of that
13 test readily available, or no, because you
14 didn't save the log file?

15 A. As far as I know, the log file
16 was not saved.

17 Q. But again, that's a test that
18 could be replicated on your model with the
19 backup data that you've provided?

20 A. Yes, it could be.

21 Q. When is it appropriate to
22 aggregate versus utilizing cross-sectional
23 information in putting together a regression?

24 MR. SOBOL: Generally?

25 MR. ROTH: Correct.

1 A. Well, aggregation has a number
2 of advantages in specific contexts. I would
3 say -- go back to my first answer, which is
4 we are interested here in an aggregate
5 question. If you were interested in an
6 individual question, you wouldn't aggregate.

7 So we are at first principles
8 interested in the -- I am interested in the
9 impact of opioid marketing in this class on
10 sales, and so I start there.

11 Aggregation can provide
12 benefits in that it cuts down on certain
13 kinds of noise, and it also -- it steps away
14 from certain kinds of endogeneity problems,
15 but I'm sure we will talk more about -- but
16 we talked a little bit about --

17 BY MR. ROTH:

18 Q. How did you know?

19 A. -- in terms of Datta and Dave,
20 the endogeneity problem that they're
21 interested in is that physicians who have a
22 propensity to prescribe your drug are the
23 ones you detail. But when we aggregate, when
24 we go up to the aggregate level, we don't
25 have that same endogeneity problem, so...

1 Q. Thank you for saying
2 endogeneity before I did so I made sure I got
3 it right. And we will talk about it.

4 But is it also true that
5 aggregation can sometimes mask patterns in
6 the data?

7 A. Well, yes, but you have to be
8 interested in those patterns for that to be a
9 problem. So if, in fact, there are patterns
10 in the data, my task as I understand it is to
11 look at the aggregate effect of marketing, so
12 that's just not a question that I was
13 particularly interested in here.

14 It's true that an average
15 effect will mask differences, if there are
16 any.

17 Q. Okay. So going back to
18 paragraph 11 of your report.

19 A. Yeah.

20 Q. This is your summary of
21 opinions. Do you see that?

22 A. Yes.

23 Q. And you also have a handy
24 chart, which we'll talk about later, but I
25 just want to focus on paragraph 11 first.

1 A. Yeah.

2 Q. So the last bullet on page 8
3 says: Using econometric models, I
4 demonstrate that I can reasonably identify
5 the extent to which the sale of prescription
6 opioids measured by the number of milligrams
7 of morphine equivalents, or MMEs, was caused
8 by any quantum of the defendants' promotional
9 efforts that counsel can prove was unlawful.

10 Do you see that sentence?

11 A. I do.

12 Q. And we'll get more into the
13 specifics on that, but how is that so, where
14 your assumption was that everything was
15 unlawful? How could you particularize your
16 model to any quantum that counsel proves?

17 MR. SOBOL: Objection.

18 A. Sure. My Table 3 does that,
19 for example, by backing out individual
20 defendants and saying, okay, let's just
21 assume that, in fact, defendant X was not
22 involved. So it can be done that way.

23 It could be done
24 propositionally. It could be done by saying,
25 no, it wasn't 1995; it really didn't start

1 until 2000. That's what I mean by "any
2 quantum," is that we could divide the
3 marketing in any measurable way over my
4 model.

5 BY MR. ROTH:

6 Q. What if the quantum of
7 promotional efforts that counsel proved
8 unlawful was influencing key opinion leaders
9 to change prescribing standards, how would
10 your model be used to evaluate conduct in
11 that situation?

12 A. I haven't been asked to look at
13 that, so I'd need to really give that some
14 thought. I wouldn't call that a quantum. I
15 would call that something else, and I'm not
16 going to make up words, but that's more of a
17 sort of qualitative piece. But in theory,
18 that's possible. I have not looked at that.

19 Q. And that's a good
20 clarification. When you say quantum, you
21 mean quantitative, not qualitative, right?

22 A. That's what I meant, yes.

23 Q. So you could take out specific
24 defendants or percentages, but you could not
25 modify your model using a qualitative test

1 for unlawfulness to determine what the impact
2 is?

3 MR. SOBOL: Objection.

4 A. I would not conclude that
5 without giving some thought. I'm sure it
6 couldn't be done for every qualitative
7 example that you could come up with, but I
8 think that there are ways of doing it
9 qualitatively, as I, again, did in the
10 Neurontin matter, looking at promotion to
11 psychiatrists as opposed to other physicians.

12 BY MR. ROTH:

13 Q. But since you have an aggregate
14 national model with aggregate detailing, is
15 there a way to go, for example, and figure
16 out where the details only to dentists were
17 if the court concludes that that was the
18 unlawful activity as opposed to detailing
19 writ large?

20 A. I'm not a hundred percent sure
21 about dentists, but as I used in the
22 Neurontin matter, there are detailing data
23 available that would allow you to look
24 nationally by specialty.

25 Q. But the detailing data you used

1 in the Neurontin matter for that exercise is
2 not the same detailing data you used in this
3 matter for your direct model, correct?

4 A. It's not exactly the same
5 because it was disaggregated by specialty,
6 but I believe those -- that is possible to
7 disaggregate by specialty. I've not done
8 that here.

9 Q. And you haven't even tested
10 whether it can be done yet, right?

11 MR. SOBOL: Objection.

12 A. I have not.

13 BY MR. ROTH:

14 Q. I'll give you a quantitative
15 measure. What if the court concludes that
16 any detail over five minutes in length were
17 presumed unlawful, but anything shorter than
18 that isn't? How can you quantify the impact
19 of the over-five-minute visits in your model?

20 A. As I sit here, I don't know
21 because I haven't thought about it. Clearly
22 I would need some data on the length of
23 details.

24 Q. We'll come back to this, I
25 promise, but back to paragraph 11 for a

1 minute.

2 So on page 9, the bullet says:
3 Based upon my analyses and assumptions from
4 counsel about the extent of promotion that
5 can be proven to be unlawful, I can
6 reasonably identify approximately [REDACTED]
7 of MMEs during the period of my analysis as
8 caused by unlawful promotion.

9 Did I read that correctly?

10 A. You did.

11 Q. And the [REDACTED] is the direct
12 number, and the [REDACTED] is the indirect number
13 from your models?

14 A. That's correct.

15 Q. Okay. And then if you look at
16 paragraph 75 -- and we talked about this
17 earlier already. But paragraph 75, which is
18 on page 50 under Calculation of But-For MMEs.

19 Do you see that?

20 A. Yes.

21 Q. You say: I have been
22 instructed by counsel to assume in my but-for
23 scenarios that the fact finder, judge or
24 jury, finds that all or virtually all
25 promotion by the manufacturer defendants from

1 1995 to present was unlawful.

2 Do you see that?

3 A. Yes.

4 Q. And then after the parentheses,
5 it says: Thus, to calculate impact for the
6 purpose of damages beginning in 2006, I
7 modeled a world in which this promotion did
8 not occur, i.e., but-for promotion equals
9 actual promotion for opioids, less all
10 promotion for opioids by the defendants and
11 their surrogates.

12 Do you see that?

13 A. I do.

14 Q. And then in Table 2 on the next
15 page, there's actually a note that says: The
16 percent of MMEs attributable to challenged
17 promotion is calculated as the difference
18 between predicted actual and predicted
19 but-for MMEs, assuming all defendants'
20 promotion is set to zero starting in 1995
21 divided by predicted actual MMEs.

22 Do you see that?

23 A. Yes.

24 Q. So your model assumption is
25 actually, not virtually, all promotion by

1 defendants is unlawful; it's that all
2 promotion by defendants is unlawful?

3 A. Yes. I guess the -- sort of
4 the legal formulation of that, I'm repeating
5 there when I say all and virtually all. I'm
6 not sure what virtually all would be
7 quantified as, 99%, but I do all, yes.

8 Q. Okay. And does that not equate
9 to assuming that all MMEs prescribed due to
10 defendants' promotion were medically
11 unnecessary?

12 A. No, that does not equate to
13 that.

14 Q. So in your model, you could
15 have unlawful promotion that leads to
16 medically necessary scripts still?

17 A. I was asked to quantify the
18 impact of the alleged unlawful promotion, not
19 to examine that question about whether that
20 prescription itself was medically
21 unnecessary, so -- so it's something I
22 haven't looked at and I don't believe it's
23 related to my charge.

24 The fact that the promotion was
25 unlawful to me does not equate to the fact

1 that a prescription was medically
2 unnecessary.

3 Q. So if promotion, whether lawful
4 or unlawful, results in a medically necessary
5 prescription, how does that prescription
6 cause damage?

7 MR. SOBOL: Objection, scope.

8 A. I'm not a lawyer, as you know.
9 And sort of what the theory of liability is
10 and what -- what plaintiffs can recover for
11 and what they can't is -- I do not know.

12 I have only been asked to
13 examine the extent to which this unlawful
14 conduct caused sales.

15 BY MR. ROTH:

16 Q. Okay. You're not a lawyer, but
17 you're a good economist. You've testified a
18 lot about causation and damages, okay, and
19 you're familiar with what a but-for world is,
20 right?

21 A. Yes.

22 Q. You have one here?

23 A. I do.

24 Q. So how does your but-for world
25 treat medically necessary prescriptions?

1 A. Again, this is --

2 MR. SOBOL: Objection.

3 But go ahead.

4 THE WITNESS: Sorry.

5 A. The model treats the right-hand
6 side variable as the thing that will be
7 proven to be unlawful, and any sales gained
8 from that unlawful conduct as subject to
9 recovery. This I know as a, thank you, good
10 economist and someone who's done that, that
11 downstream of my analysis there's a damage
12 number that plaintiffs I believe will try to
13 recover.

14 So as an economist, to me, the
15 theory is that any gains, whether or not they
16 resulted in medically necessary
17 prescriptions, are subject to recovery. As
18 an economist, that seems like a reasonable
19 theory if we wanted to deter fraudulent and
20 misleading information. This is the same
21 analysis that I did in the Neurontin case.

22 BY MR. ROTH:

23 Q. Stated differently, your model
24 will calculate causation by defendants'
25 marketing even for medically necessary

1 prescriptions?

2 A. It does not distinguish. And
3 to be clear, whether or not there were
4 medically necessary prescriptions caused by
5 the misconduct, I can't say for sure.

6 Q. And as an economist, is that
7 not something you think you should take into
8 account in your but-for world where you're
9 opining that but for the defendants' conduct,
10 fewer of these MMEs would be out in the
11 world?

12 A. Absolutely not. Again, as an
13 economist, to me, if the allegations are
14 true, I can see a strong economic rationale
15 for ensuring that liability is attached to
16 all these ill-gotten gains from the alleged
17 misconduct.

18 Q. But there is a parallel world
19 where a manufacturer may promote lawfully and
20 that lawful promotion would result in
21 medically necessary prescriptions, correct?

22 MR. SOBOL: Objection.

23 A. I -- you have a lot of parallel
24 worlds I've noticed, but yes, I think we
25 agreed at the beginning of the day that there

1 is such a thing as lawful marketing, and it
2 does generate sales.

3 Some of those sales may be
4 medically necessary, some may be medically
5 unnecessary, even if there's no unlawful
6 conduct.

7 BY MR. ROTH:

8 Q. I asked some of these
9 questions, but I did promise I'd come back.

10 How would your model work if
11 the court finds that only detailing visits
12 where the representative spoke about
13 addiction risk were unlawful?

14 A. I don't know the answer to that
15 question. I have not thought about how one
16 could parse that out, so I don't know as I
17 sit here.

18 Q. You did mention time could be
19 quantified, so I guess to clarify, would you
20 be able to calculate causation if the court
21 found, for example, that only detailing that
22 happened between 1996 and 2000 were unlawful?

23 A. Yes, my model is capable of
24 doing any combination of manufacturer and
25 time.

1 Q. What about drug?

2 A. And drug.

3 Q. Okay. So you could do -- you
4 could take out manufacturers, right?

5 A. Yes.

6 Q. You could take out drugs?

7 A. Yes.

8 Q. And you could take out years?

9 A. Yes.

10 Q. Okay. Beyond that, is there
11 anything you can take out of your model?

12 MR. SOBOL: Objection.

13 A. Well, as I said earlier, I
14 believe that it's possible to take out
15 physician specialties.

16 BY MR. ROTH:

17 Q. Right. And we talked about
18 that. But you're not certain it can be done,
19 and you haven't tested it yet?

20 MR. SOBOL: Objection.

21 A. I haven't tested that.

22 BY MR. ROTH:

23 Q. What if the court finds that
24 only off-label marketing was unlawful? Is
25 there any way your model can be adjusted to

1 account for just the unlawful off-label
2 detailing?

3 A. I assume that you're talking
4 about specific off-label messages. Again, I
5 haven't -- I haven't thought about how the
6 detailing itself could be parsed in that way.
7 There would need to be another source of
8 information for that to be possible.

9 Q. You need a different dataset
10 basically?

11 A. Yes. The thing with detailing
12 is that it's a face-to-face visit, so we can
13 see what messages the detailer brought on
14 paper with them but not what came out of
15 their mouths.

16 Q. What if the court finds that
17 only journal advertising were unlawful? How
18 would your model account for that?

19 A. Well, as I believe I say in my
20 report, the journal advertising data is very
21 spotty for these drugs, so I've not included
22 that as a separate factor. It's already out
23 of my model. I would have to give that some
24 consideration.

25 Q. Okay. If we look at

1 Attachment D, which is towards the back, I
2 want to go to page D6. And there's a section
3 at the bottom --

4 MR. SOBOL: I'm sorry. Wait.

5 MR. ROTH: D6 of Attachment D.

6 MR. SOBOL: Is it the table?

7 MR. ROTH: No, it's the text.

8 It's the technical write-up of the
9 regression.

10 THE WITNESS: Yeah.

11 MR. ROTH: I feel like it's
12 always Attachment D in every case, by
13 the way.

14 THE WITNESS: Is it?

15 Interesting.

16 BY MR. ROTH:

17 Q. Are you in Attachment D, D6?

18 MR. SOBOL: It's just the same
19 attachment.

20 A. I am.

21 BY MR. ROTH:

22 Q. It's all in the same report,
23 right?

24 A. You didn't notice? Yeah.

25 Q. Well, Tom is involved for sure.

1 All right.

2 So looking at Attachment D,
3 page D6. This may be from one of the same
4 attachments. I don't know. Do you see
5 there's a section that says Comcast
6 Considerations?

7 A. Yes, I do.

8 Q. What is the reference to
9 Comcast there?

10 A. Well, again, I'm not lawyer,
11 but I understand that there was a case
12 involving Comcast, and that the -- what it
13 concerns, again, from a layperson's
14 understanding, is about the ability of the
15 damages as presented to the court to conform
16 to different conclusions about the but-for
17 scenario.

18 Q. Essentially the issue we've
19 been talking about for the last --

20 A. The issue we've been talking
21 about.

22 Q. And why were you concerned
23 about the application of Comcast to this
24 case?

25 MR. SOBOL: Objection, assumes

1 a fact not in evidence.

2 BY MR. ROTH:

3 Q. Assuming you were.

4 A. As you recall, the last part of
5 my assignment was to report on how my
6 conclusion would be different if there were
7 different considerations with regard to who's
8 in, who's out by defendant, for example. So
9 yes.

10 Q. Okay. I'm trying to streamline
11 here because we've covered more ground --

12 A. We're going to cover 14 hours
13 no matter what --

14 Q. That's true.

15 A. -- so streamlining may be good
16 for you, but it's not good for me.

17 MR. ROTH: I'm having fun. I
18 think you are too.

19 THE WITNESS: Of course.

20 MR. LONERGAN: What about us?

21 BY MR. ROTH:

22 Q. Do you agree that your model
23 does not measure the impact -- we went over
24 this. I'm not going to ask that again.
25 Strike that.

1 Could you have modeled an
2 individual manufacturer separately?

3 MR. SOBOL: Objection, asked
4 and answered.

5 A. It was not something I
6 attempted to do. I think mechanically it is
7 possible. But as I noted, one of the reasons
8 for using an aggregate time series is that we
9 smooth over a lot of noise in the data, so I
10 don't know whether an individual
11 manufacturer-level model would be feasible.

12 BY MR. ROTH:

13 Q. Okay. In a but-for world,
14 where all of the unlawful detailing, which is
15 your assumed all defendants' detailing, were
16 replaced with lawful detailing, would there
17 be any change in overall prescribing?

18 A. Sorry. I just -- so the model
19 doesn't itself have a presumption about
20 lawful and unlawful. The but-for scenario is
21 where that presumption is incorporated, so
22 the model is the model.

23 Q. I asked a bad question and you
24 properly called me on it. Let me ask a
25 better question.

1 If we assume that all unlawful
2 detailing is lawful, then the actual
3 prescribing and the but-for prescribing in
4 your models would be equal to each other?

5 A. Yes, that's correct. Those two
6 predicted values would be identical.

7 Q. So the percent of MMEs
8 attributed to unlawful detailing in that
9 scenario would be zero percent.

10 A. Yes. If marketing were the
11 same in both scenarios, then there would be
12 no difference.

13 Q. Assume for a minute that a
14 manufacturer's detailing is found to be
15 unlawful but it did not engage in any of the
16 other marketing misconduct alleged by
17 plaintiffs with respect to the key opinion
18 leaders, journal advertising and the other
19 factors.

20 How would your model account
21 for harm for that specific manufacturer?

22 MR. SOBOL: Objection.

23 A. In my opinion, that would be a
24 legal question because, again, all the
25 manufacturers are operating in the same

1 ecosystem. According to the complaint and
2 everything I know as a health economist, the
3 effects of one manufacturer's unbranded
4 marketing -- I use that to refer to the
5 guidelines and those kinds of activities --
6 will spill over on to another manufacturer,
7 and I don't know whether it would be
8 appropriate to pull that out or not.

9 BY MR. ROTH:

10 Q. That's a long answer. I want
11 to -- I think I asked a more specific
12 question.

13 A. Sure.

14 Q. So if detailing is unlawful --

15 A. Yes.

16 Q. -- and let's say also the other
17 stuff, okay, key opinion leaders influencing
18 standards of care is also unlawful, and a
19 manufacturer just detailed, they're going to
20 have the same percentage of liability in your
21 direct model whether or not they engaged in
22 the other unlawful conduct, correct?

23 MR. SOBOL: Objection.

24 A. Yes, that's true. Although
25 it's true in terms of what I calculate in

1 Table 3. Just to be clear, I don't have an
2 opinion on liability. That's a legal matter.
3 But what I do in Table 3 is I say, okay,
4 well, what would happen if we said the
5 detailing by Purdue were lawful, what would
6 happen there?

7 So whether or not that quantum
8 is exactly what liability is, I don't -- I
9 don't really know how the court is going to
10 see that, and so that's why I don't really
11 know if you would need to say, well, some of
12 why your detailing was so productive was
13 caused by somebody else's activity. I don't
14 know whether it would make sense to back that
15 out.

16 BY MR. ROTH:

17 Q. So let's take the opposite.

18 A. Yeah.

19 Q. Someone's detailing is entirely
20 lawful. There's no issue there. But they've
21 influenced the standards of care through key
22 opinion leaders, they've paid off doctors,
23 they've done all of the parade of horrors
24 that the plaintiffs allege, and the court
25 finds that that in fact is unlawful. In your

1 model, that manufacturer has no liability,
2 correct?

3 MR. SOBOL: Objection.

4 A. Well, again, my model is
5 looking at the aggregate causation between
6 marketing and sales; it is not designed to
7 assign liability to individual manufacturers
8 nor, again, am I certain how counsel or the
9 courts would do so.

10 The purpose of Table 3 is to
11 show that I can back out individual levels of
12 detailing, not to assign liability. So I --
13 I don't know exactly how that would proceed,
14 even -- even without having these variable
15 assumptions across defendants. I have not
16 looked defendant by defendant at something
17 like liability.

18 BY MR. ROTH:

19 Q. Okay. So let's look aggregate.

20 If for all the manufacturers
21 the conclusion is that the detailing is
22 entirely lawful, but the manufacturers
23 engaged in other conduct that the court finds
24 is unlawful, what would the result of your
25 model be in that world?

1 MR. SOBOL: Objection.

2 A. I would have to give it some
3 thought, but again, my preferred model
4 ultimately captures the effect of all that
5 other stuff that we're calling as really is
6 the what happens -- in part, a chunk of it is
7 what happens to the promotional effectiveness
8 after the first turning point and before the
9 second turning point. And so in theory, one
10 could look at that, but it would really
11 depend on the specific set of facts.

12 BY MR. ROTH:

13 Q. It would require a new model
14 probably?

15 MR. SOBOL: Objection.

16 A. I don't know that it would
17 require a new model. It would require a new
18 but-for analysis.

19 BY MR. ROTH:

20 Q. Back to your body of your
21 report, paragraph 64. You say: The
22 econometric analyses serve two purposes.
23 First, they indicate that in economic terms
24 there is a causal relationship between the
25 defendants' promotion and prescriptions of

1 opioids so that if the allegations of
2 misconduct are proven true, impact can be
3 found.

4 Do you see that?

5 A. Yes.

6 Q. But you actually didn't assess
7 specifically a causal relationship between
8 promotion and prescriptions, right? Those
9 are not the two variables on your X and Y
10 axis?

11 MR. SOBOL: Objection.

12 A. Well, I look at the stock of
13 detailing, which I argue and believe is a
14 reasonable proxy for promotion. It is not,
15 strictly speaking, all promotion. To the
16 extent that it is measured with error, it
17 understates the effect of promotion.

18 BY MR. ROTH:

19 Q. If we wanted to be precise,
20 though, what your model actually shows is a
21 correlation between detailing and MMEs?

22 MR. SOBOL: Objection.

23 A. Well, as we talked about
24 earlier and will no doubt talk about again,
25 any regression analysis can have a causal

1 interpretation or not, depending on a number
2 of factors.

3 I interpret this regression
4 analysis as showing causation between
5 marketing and sales, and it does, in fact,
6 use detailing contacts as the measure of
7 marketing.

8 BY MR. ROTH:

9 Q. And if we want to be even more
10 precise, when we're talking about defendants
11 detailing, we're talking about all detailing
12 without distinguishing between lawful and
13 unlawful as we've talked about?

14 MR. SOBOL: Objection, asked
15 and answered.

16 A. For the purposes of my
17 analysis, I've been asked to assume that all
18 detailing in this period was unlawful, so
19 that distinction is not relevant.

20 BY MR. ROTH:

21 Q. So your model does not analyze
22 causation between the false promotion as
23 alleged in the complaint and the number of
24 MMEs prescribed?

25 MR. SOBOL: Objection.

1 A. I would disagree. That is
2 exactly what my model does. Again, we can
3 agree that I have not separately proven that
4 that detailing was unlawful, but I understand
5 that counsel for plaintiffs intend to prove
6 that, and so I have undertaken to examine the
7 causal effect of that allegedly unlawful
8 conduct.

9 BY MR. ROTH:

10 Q. Which is all promotion by
11 defendants?

12 A. Which is all promotion by
13 defendants from 1995 to the end of my data.

14 Q. And when does your data end?

15 A. Mid 2018.

16 Q. Okay. Do you plan on updating
17 it if we go to trial in 2019 to take us
18 through today?

19 MR. SOBOL: Objection.

20 A. I haven't been asked to do
21 that. I don't know if I would be asked to do
22 that.

23 MR. ROTH: Why don't we take a
24 break, because I realize we've
25 probably covered some of these next

1 questions and I can streamline.

2 THE WITNESS: Okay.

3 THE VIDEOGRAPHER: The time is
4 10:58 a.m. We're now off the record.

5 (Recess taken, 10:58 a.m. to
6 11:13 a.m.)

7 THE VIDEOGRAPHER: The time is
8 11:13 a.m. We're back on the record.

9 BY MR. ROTH:

10 Q. Professor Rosenthal, if you
11 would please turn to paragraph 59, which is
12 on page 42. All right. So we're going to go
13 step by step here.

14 A. Okay.

15 Q. You say: My primary dependent
16 variable, the outcome to be explained, is the
17 number of MMEs for all drugs at issue in this
18 matter.

19 Do you see that?

20 A. Yes.

21 Q. Okay. Why did you look at MMEs
22 as opposed to prescriptions or some other
23 measure?

24 A. Sure. Because, as I note in
25 this paragraph, the intensity of the medicine

1 that the patient is getting is a function not
2 just of the number of prescriptions, but the
3 number of pills and the strength of those
4 pills, and specifically the milligrams of
5 morphine equivalence is a way of being able
6 to cross-walk across drugs that have
7 different -- I'm going to use the term
8 "strength." I'm not sure that would strictly
9 be correct, but different strength in terms
10 of how much morphine they deliver.

11 Q. You agree that doctors
12 prescribe drugs, they don't prescribe MMEs to
13 patients?

14 A. They prescribe drugs, dosages,
15 durations, all of which translate into MMEs.

16 Q. And if you're looking at things
17 in terms of MMEs, you're not breaking it down
18 by drug molecule; is that correct?

19 A. Well, again, in my analysis as
20 we've talked about, I -- even if I were
21 looking at -- I do a version of the model as
22 you know, that's in Attachment D somewhere,
23 where I look at pills. And I don't
24 distinguish across drugs there either, again,
25 because my goal is to look at the market as a

1 whole.

2 Distinguishing by drugs is
3 not -- it's not unique to the fact that I'm
4 looking at MMEs.

5 Q. I know you're not a medical
6 doctor, but you do understand that these
7 drugs have different chemical compounds and
8 might have differences in their labeling and
9 indications?

10 A. Yes, I do understand that there
11 may be some differences, and again, I use
12 MMEs as a common unit of impact, as it were,
13 that is more nuanced than prescriptions or
14 pills but does not distinguish beyond the
15 morphine equivalence.

16 Q. But because you're looking at
17 MMEs, you're losing data with respect to the
18 length or course of treatment, correct?

19 A. Well, no. Actually, I'm not
20 specifically looking at the length, but if,
21 for example, patients are getting longer
22 courses of treatment, that will show up as
23 more MMEs.

24 Q. And similarly, if patients are
25 getting stronger molecules, that will also

1 show up as more MMEs?

2 A. That is correct.

3 Q. So you could have one patient
4 taking 100 MMEs over the course of ten days
5 and ten patients taking ten MMEs over the
6 course of the same period of time, and your
7 model makes no distinction between those two
8 circumstances?

9 A. Yes, that's correct. Again,
10 because I am -- I am responsible for looking
11 at the effect of marketing on sort of the
12 quantity of morphine equivalence that were
13 out in the world. Whereas Professor Cutler
14 is then going to look at the effect of those
15 MMEs on harms, and his model will establish
16 the relationship between MMEs and harms.

17 Q. So if the court, for example,
18 found that certain dosages were more prone to
19 abuse, okay, or dosages given over a certain
20 period of time are more prone to abuse, would
21 you have any way in your model to drill down
22 on that distinction and segregate out the,
23 quote, lawful MMEs that don't fit whatever
24 definition the court crafts on that?

25 A. It seems to me that you've put

1 two things into your question, so maybe it's
2 just I don't understand the way you used the
3 terms "if the court determines."

4 So if the court determines that
5 certain packaging is subject to abuse, but
6 are you saying that the court determines that
7 any --

8 Q. Let me try it again.

9 A. Yeah.

10 Q. Suppose the court or jury finds
11 that messaging related to higher-dosage drugs
12 was false but messaging for lower-dosage
13 drugs was not, how would your model that
14 looks at total MMEs account for that?

15 A. Well, if I understand you
16 correctly, you're asking again about whether
17 I could narrow down my analysis by drug,
18 which I can do.

19 Q. Not by drug, but by MMEs, if it
20 were by drug and strength?

21 A. Yes. So the observations
22 ultimately -- I can see you haven't played
23 around with the enormous dataset, but they
24 ultimately go to the NDC level, and an NDC
25 code is a drug, manufacturer, strength,

1 formulation, I think those four dimensions.

2 Q. Okay. But what if it's
3 strength over a certain period of time in the
4 prescription? What if it's, you know,
5 400 milligrams for a week or more is a
6 problem, but less than 400 for a shorter
7 period of time is not?

8 A. I think you're confusing again
9 inputs and outputs here, so -- of course, I
10 can't -- I don't presume to know what the
11 court would think. But as we talked about
12 before, what I'm really looking at is the
13 effect of some set of marketing efforts on
14 all the prescriptions that flowed from it.

15 So it's hard for me to imagine
16 that the court would say, yes, the conduct
17 was unlawful but some prescriptions that
18 flowed from it we won't count against damages
19 and some we will. And so --

20 Q. You can't conceive of that
21 happening?

22 A. It's just not clear to me. It
23 just seems, again, as we talked about before,
24 I'm not a lawyer, so I don't know exactly how
25 liability would work that way.

1 My analysis is really intended
2 to look at all MMEs. To the extent that only
3 MMEs that were packaged a certain way, if
4 that's my shorthand for, you know, dose and
5 duration, for a given patient at a given
6 point in time, if -- if those are the only
7 things that create harms, then Professor
8 Cutler will find a very weak relationship
9 between the MMEs and the harms that he's
10 looking at. I don't believe that's what he
11 finds, but that question could have a
12 downstream effect, but I know of no theory
13 like that.

14 Q. Okay. When you mentioned the
15 drugs at issue in this matter, what are the
16 drugs at issue in this matter?

17 A. Well, it's a very long list.
18 They're in Attachment C, if you'd like to go
19 through them with me.

20 Q. We don't have to go one by one,
21 but the drugs contained in Attachment C is
22 what you mean?

23 A. Yes.

24 MR. SOBOL: We could spend an
25 hour or so doing that.

1 BY MR. ROTH:

2 Q. So -- but if I understand,
3 though, the drugs contained in Attachment C
4 are just drugs that someone has associated
5 with one of the manufacturer defendants in
6 this case, correct?

7 A. I actually need to look at
8 Attachment C to see that it doesn't have an
9 "all other" category.

10 Q. It may. Take a minute to look
11 for it, if you want.

12 A. Yeah. Yeah, I will.

13 (Document review.)

14 A. I think Table C.1 is all of the
15 drugs. It's not listed by manufacturer, but
16 it has all the drug names.

17 BY MR. ROTH:

18 Q. So these are all of the --

19 A. Yes, I believe --

20 Q. -- chemical compounds?

21 A. -- these are all the drug
22 names.

23 Q. Okay. So when you say drugs at
24 issue in this matter, you're referring to the
25 drugs listed in Table C.1?

1 A. That's correct.

2 Q. Now, you say in Attachment D
3 that your intent was to include all drugs
4 that have been scheduled as Schedule II at
5 any point in time; is that correct?

6 A. That's correct.

7 Q. Does your model differentiate
8 between detailing visits for drugs that were
9 Schedule III at the time they were detailed
10 but later became Schedule II?

11 A. It does not.

12 Q. And did you have any discussion
13 about doing that?

14 A. I don't recall specifically,
15 but again, I make clear the assumption that
16 because those drugs were rescheduled that
17 they're considered to be Schedule II for my
18 analysis in every way.

19 If that assumption were proven
20 wrong, it could easily be adapted, as we
21 talked about before. Changing what's in the
22 but-for scenario by drug by year by defendant
23 is relatively straightforward.

24 Q. So you could take a drug that
25 you've included detailing for prior to 2014,

1 for example, when oxycodone -- hydrocodone
2 got reformulated --

3 A. I could.

4 Q. -- and take out everything
5 before 2014?

6 A. That's correct.

7 Q. And that would change the
8 numbers in Table 3 of your report?

9 A. Presumably, yes.

10 Q. So you understand obviously
11 that some opioids have higher potency than
12 others, and that's why you used MMEs it
13 sounds like?

14 A. Yes, that's correct.

15 Q. And the conversion factors in
16 your data appendix, which we can look at in a
17 little bit, do you know where you got those
18 numbers from? Was it the DEA website?

19 A. They mostly come from the CDC
20 actually, but they didn't have all of them,
21 so assuming some of them come from that
22 Excellus document, I'd have to just look at
23 what I cite, but I know we had to go to a
24 second document.

25 Q. Okay. By definition, a

1 prescription of a drug with a higher MME
2 conversion would have a greater impact on
3 overall MMEs?

4 A. Yes, I think that that is a
5 statement on its face that must be true.

6 Q. Does your model differentiate
7 between immediate and extended release
8 opioids?

9 A. My model does not differentiate
10 between immediate and extended release.

11 Q. And your model does not
12 differentiate between opioids prescribed for
13 short-term use versus long-term use?

14 A. As we talked about before, I am
15 counting all MMEs, whether they were in a
16 3-day prescription or a 30-day prescription.

17 Q. And your model does not
18 differentiate between abuse-deterrent
19 formulations and nonabuse-deterrent
20 formulations?

21 A. Again, of course, that would be
22 a product-level characteristic. One could do
23 so, but I have not, no.

24 Q. Your model does not
25 differentiate between a hundred patients each

1 taking one MME versus one patient taking a
2 hundred MMEs?

3 A. For the purposes of my
4 analysis, that is irrelevant. I'm trying to
5 understand the total sales, yes.

6 Q. And you don't differentiate
7 between product differences like, for
8 example, a fentanyl patch versus a Vicodin
9 pill?

10 A. I am not distinguishing.
11 Again, I do not include injectables, but
12 otherwise, I include these other
13 formulations.

14 Q. Otherwise, all MMEs are created
15 equal in your world?

16 A. Yes. For the purposes of my
17 analysis, I'm counting all MMEs.

18 MR. SOBOL: In your world.

19 THE WITNESS: Again.

20 BY MR. ROTH:

21 Q. In your analysis, all MMEs are
22 created equal.

23 A. That's correct.

24 Q. It's nice that we all get our
25 own worlds.

1 MR. SOBOL: "Your analysis," is
2 that one or two words?

3 MR. ROTH: It's not starting
4 with a U.

5 BY MR. ROTH:

6 Q. And you don't differentiate
7 between the indications for which the MMEs
8 are prescribed in your analysis, correct?

9 A. That's correct. I'm looking at
10 total sales.

11 Q. Right. So whether an MME is
12 prescribed for surgery or chronic pain
13 doesn't matter for your direct model?

14 A. As we talked about earlier, I'm
15 really focusing on the unlawful nature of the
16 conduct and looking at all the prescriptions
17 or all the MMEs that resulted from that.

18 Q. Okay. So now let's look at
19 paragraph 60 of your report.

20 A. Okay.

21 Q. Which is the same page we were
22 on, I think. It's on page 42.

23 A. Okay.

24 Q. Are you there?

25 A. Yep.

1 Q. It says: The key explanatory
2 variable in the model is the number of
3 detailing contacts for opioids.

4 Do you see that?

5 A. I do.

6 Q. And we've been talking about
7 that, that that's sort of what you use for
8 your stock of promotion are the detailing
9 contacts at a given point in time, multiplied
10 by the depreciation factor?

11 A. That's correct.

12 Q. And you -- we agree that
13 detailing is just one of a variety of methods
14 a drug company may use to promote its
15 products to physicians?

16 A. Yes. And again, the data
17 suggest that it's a dominant one here.

18 Q. If you look at paragraph 66,
19 you say: While the defendants actively
20 sought to manipulate the scientific and
21 popular understanding of the risks of opioids
22 prior to 1999, according to plaintiffs'
23 marketing expert Perri, the release of the
24 American Pain Society and American
25 Association of Pain Medicine consensus

1 statement on pain, followed by the Federation
2 of State Medical Board Model Guidelines and
3 the Joint Commission on Accreditation of
4 Healthcare Organizations, pain management
5 standards were also important marketing
6 tools.

7 Do you see that?

8 A. Yes.

9 Q. And then you say: Through such
10 advocacy, as well as traditional marketing
11 vehicles, Dr. Perri finds that defendants
12 sought to change the narrative about opioid
13 therapy, opening the floodgates to
14 prescribing.

15 Do you see that?

16 A. Yes.

17 Q. But, again, your model does not
18 look at non-detailing promotion as part of
19 the stock?

20 A. Non-detailing promotion is not
21 included in the stock; it's incorporated in
22 my model in two ways.

23 One, in Model B, I used the
24 different eras during which these activities
25 were going on to allow promotional

1 effectiveness to be either increased or
2 decreased by those factors.

3 And two, in Model C, I
4 incorporate several of the events to see
5 whether any of that changes my results, and
6 find that they do not.

7 Q. Did you consider using other
8 measures of promotion beyond detailing as
9 your explanatory variable?

10 A. I did. I believe there's a
11 footnote somewhere. I just need to find the
12 right paragraph. I know this paragraph moved
13 at one point, so now I can't remember whether
14 it's early or late. Oh, here, paragraph 56.

15 Q. Yep, I was going to take you
16 there.

17 A. Okay. Perfect. Well, you just
18 let me struggle instead. Yeah.

19 So as I note there, IQVIA,
20 where we get the data on promotion, has no
21 spending on professional journal
22 advertisements or direct-to-consumer
23 advertising, and the free sample data seemed
24 very spotty, and from what I could
25 understand, free samples were used

1 infrequently, perhaps for obvious reasons in
2 this particular class.

3 Q. On the journal advertisements
4 or the direct-to-consumer advertising, you
5 did look at marketing budgets for the
6 manufacturers, correct?

7 A. Yes.

8 Q. They're cited in your report I
9 think in an earlier section.

10 A. Yes.

11 Q. Did you consider using those to
12 try to measure journal advertisements or some
13 of these other categories?

14 A. I think those data would
15 just -- A, they're not monthly, and B,
16 they're -- they're very incomplete with
17 regard to the drugs, right? If we were
18 trying to get this for every drug, we do have
19 product profit and loss statements for
20 specific drugs, and then aggregate marketing
21 budgets for the companies as a whole, but
22 it's simply not precise enough to use here.

23 Q. Okay. So I want to go through
24 this paragraph carefully.

25 A. Sure.

1 Q. I suspect you knew I would.

2 So you mentioned that you
3 thought that detailing was the most dominant
4 form of promotion in a prior answer, and, in
5 fact, you write that as your first reason in
6 paragraph 56.

7 Do you see that?

8 A. Yes.

9 Q. And your citation for that is
10 just to Dr. Perri's report.

11 Do you see that?

12 A. Yes, and then I go on to
13 describe what the data show.

14 Q. Right. So that's a good
15 clarification.

16 So when you're saying it's the
17 most dominant form of promotion, what you
18 really mean is in the data you reviewed, it
19 was the most dominant form of promotion that
20 was tracked?

21 A. That's correct.

22 Q. Okay. Do you have any basis to
23 think beyond the data you reviewed that
24 detailing is the most dominant form of
25 promotion in the opioid market by, for

1 example, dollars spent?

2 A. Well, I guess in the product
3 profit and loss statements that I looked at,
4 detailing was clearly in the majority.
5 Obviously -- so the detailing expenditures
6 that you can get in profit and loss
7 statements, they look a little different than
8 what you can get from IMS Health because the
9 sales force is -- is an expense that itself
10 isn't typically dedicated to one product, so
11 there's some allocation, versus the IQVIA
12 data are aggregating up from reported visits.

13 So they're a little bit apples
14 and oranges, but in the product and loss
15 statements that I looked at, yes, that
16 confirmed my understanding that detailing was
17 certainly the largest marketing tool.

18 Q. Pausing on the IQVIA data, you
19 don't know that those are limited to one
20 product either, right? There could be a
21 detail where the physician was detailed on
22 five drugs and it gets reported to all five
23 in the IQVIA data?

24 A. That's correct. So whatever
25 was discussed is what gets flagged for the

1 IQVIA data. It could be multiple drugs.

2 Q. So when you're looking at the
3 IQVIA data for your detailing data, you don't
4 know whether opioids were the focus of the
5 conversation or not, if more than one drug
6 was reported for that contact?

7 A. If more than one drug was
8 reported, I don't know the specific time
9 allocation.

10 Q. And you didn't do any analysis
11 to try to dissect that issue?

12 A. Well, there's no analysis that
13 I could imagine that you could
14 retrospectively go back and figure out what
15 was talked at for how long, and it's not
16 totally clear that time would be the best
17 measure.

18 So maybe you came and talked
19 about three drugs to me and I was convinced
20 to prescribe on all three of them, so is the
21 detail only one-third as value than the
22 detail dedicated to one of those drugs? It
23 doesn't seem to me that it would be.

24 Q. Then sticking with
25 paragraph 56, your second reason you focused

1 on detailing is pharmaceutical marketing
2 programs typically combine various forms of
3 marketing such that were there to be an
4 increase or decrease in promotional
5 detailing, it is reasonable to expect that
6 some other forms followed that course. And
7 then you go on to say it's a good proxy for
8 that reason.

9 Do you see that?

10 A. Yes.

11 Q. And what is your basis for that
12 expectation, that other forms of marketing
13 follow detailing?

14 A. Sure. My experience doing
15 research in this area, and particularly using
16 the IQVIA data, the two that are most heavily
17 correlated tend to be detailing and sampling,
18 but there's correlation across all mechanisms
19 where there are data reported for all of
20 them.

21 Q. Okay. Did you perform any
22 study or analysis on the IQVIA data or any
23 other data in this case to confirm that in
24 the opioid market your experience holds true
25 with regard to how detailing and other forms

1 of promotion are correlated?

2 A. Well, as I mentioned, when I
3 looked at the IQVIA data for journal
4 advertisements, direct-to-consumer
5 advertising, sampling, there was very little
6 data there. I have no reason to believe that
7 they're just not measuring it. It may be
8 that there are some kinds of advertising that
9 we see in the marketing budgets that IQVIA
10 doesn't capture. But to the extent that the
11 IQVIA data are complete, it was not really
12 possible to do a correlation analysis because
13 there was so little data for these other
14 tools.

15 Q. So when you say it's a
16 reasonable expectation that other forms of
17 marketing follow detailing, that's really
18 just an assumption based on your experience
19 with other drugs in other cases?

20 A. It's based on my experience
21 with very similar kinds of analyses with
22 other drugs. And again, I cite to
23 Dr. Perri's report at the beginning of this
24 where he talks about the coordination of
25 marketing mechanisms, so it's very consistent

1 with his opinions as well.

2 Q. Yeah. But to be clear, that's
3 an assumption you're making that's not
4 supported by any specific work you've done to
5 confirm it's true that detailing and other
6 forms of promotion are correlated for
7 opioids?

8 MR. SOBOL: Objection, asked
9 and answered.

10 A. Again, the analysis -- the
11 correlation analysis was not possible here,
12 so I'm relying on my past experience and
13 Dr. Perri's expertise.

14 BY MR. ROTH:

15 Q. Okay. Then you say: Third,
16 alternative measures of promotion that I
17 could obtain from available sources have
18 substantial missing data, e.g., estimates of
19 payments to pain advocacy groups can only be
20 obtained from the records of some, but not
21 all manufacturers.

22 Do you see that?

23 A. Yes.

24 Q. And that's what we've been
25 talking about.

1 A. Yes.

2 Q. Are you certain that every
3 manufacturer in this case has made payments
4 to pain advocacy groups for opioids?

5 A. Well, given -- that's -- it's
6 hard to be certain about something for which
7 I have incomplete data, so I -- there are a
8 number of documents that I cite to that show
9 these kinds of payments, and I believe other
10 experts have tracked these payments as well.

11 But am I certain that every
12 defendant has evidence of that type? No, I'm
13 not certain.

14 Q. And then you wrap up this
15 paragraph saying: Note that in this case
16 there appears to be substantial evidence that
17 through means other than promotional
18 spending, the defendant manufacturers
19 fundamentally changed opioid prescribing
20 standards. The direct approach does not
21 calculate the efforts -- the effects,
22 sorry -- of the nonpromotional marketing and
23 is thus conservative.

24 Do you see that?

25 A. Yes.

1 Q. But that's not universally true
2 for all manufacturers, is it?

3 MR. SOBOL: Objection.

4 A. Again, my opinions here really
5 are to look at the market as a whole, and
6 even if there were a defendant that did not
7 incur this kind of spending, the effects of
8 changing things like guidelines would --
9 would flow through to everyone's drugs,
10 right.

11 So these are sort of broad
12 changes in the environment of prescribing,
13 and so again, I don't have an opinion on the
14 liability question of whether there's a
15 defendant who has not undertaken the
16 unbranded advertising, whether they therefore
17 should not be liable for its effects. I
18 don't know the answer to that.

19 BY MR. ROTH:

20 Q. What if a manufacturer engages
21 only in limited detailing and not other types
22 of promotional activities? It would not be
23 conservative for that manufacturer to only
24 look at detailing, correct?

25 A. The purpose of my analysis is

1 not to assign liability to individual
2 defendants. It's to look at the aggregate
3 effect. So I don't know what would be
4 appropriate. That to me seems like a legal
5 question.

6 Q. Would it be conservative from
7 an economic perspective if a manufacturer
8 purchases an opioid product in, say, 2008 and
9 engages in detailing but no other marketing?

10 A. I do not calculate any
11 estimates at the individual defendant level,
12 so I cannot characterize them as conservative
13 or otherwise. I'm only looking at aggregate
14 effects.

15 Q. Okay. I'm just trying to get
16 at what you mean when you say the direct
17 approach is conservative. It strikes me that
18 for a defendant who didn't participate in the
19 market ecosystem until late in the game and
20 only detailed, it's actually the opposite of
21 conservative the way your model calculates
22 damages.

23 MR. SOBOL: Objection.

24 A. I believe that is inaccurate.
25 My model does not calculate damages for any

1 individual defendant, period.

2 BY MR. ROTH:

3 Q. Causation, sorry, I should have
4 said.

5 A. So again, because I am not
6 looking at impact for an individual
7 defendant, we cannot characterize my analysis
8 as conservative or otherwise for an
9 individual defendant. It is for the market
10 as a whole.

11 Q. Okay. So when you say in
12 paragraph 56 that the approach is
13 conservative, you mean on an aggregate basis
14 it is conservative because it looks at
15 detailing and not other things?

16 A. That's correct.

17 Q. Okay. Sort of implicit in that
18 statement and other things you've said today
19 is an assumption that all manufacturers
20 market opioids the same way.

21 MR. SOBOL: Objection.

22 BY MR. ROTH:

23 Q. Do you agree with that?

24 A. I don't believe so. Again, I
25 include in my model detailing. To the extent

1 that there's variation in the way
2 manufacturers detail, the specific details
3 may generate more prescriptions or fewer, and
4 my model captures the average effect. That's
5 what the coefficients basically tell us is
6 the average effects.

7 So there may be variation in
8 there, but for the purposes of calculating
9 aggregate impact, the average is appropriate.

10 Q. So for manufacturers who have
11 detailing that's below average, they're being
12 brought up to the average by the way you've
13 aggregated the model in terms of causation?

14 A. Well, by definition, an average
15 will be not the same as all the individual
16 components unless there's no variation, and
17 so there will be some who are brought up and
18 some who are brought down.

19 It's my belief, as we talked
20 about before, that this aggregate model is
21 the most reliable model; because there's
22 substantial spillover effects, because there
23 can be noise in the data when we try to
24 disaggregate it too much. I think for that
25 reason, the aggregate model is preferable.

1 Q. You know, though, that not
2 every manufacturer markets products the same
3 way?

4 A. I guess -- I'm not exactly sure
5 how to answer that question. As we've talked
6 about before, I am not a pharmaceutical
7 marketing expert. I leave that to Dr. Perri.
8 I think it's reasonable to assume that there
9 is some variation in tactics and the like
10 across manufacturers and perhaps across
11 products.

12 Q. Well, let's look at one thing
13 you do talk about. So there's a difference
14 in the way promotion is engaged in by brand
15 companies and marketing may be engaged in by
16 generic companies, correct?

17 A. Yes, brand companies are
18 primarily the ones that engage in marketing.

19 Q. A generic company might still
20 detail but may just talk about price and
21 formulary status?

22 MR. SOBOL: Objection.

23 A. Generally, manufacturers will
24 not detail physicians for generics. They may
25 have other sales force activities that they

1 do that relate to price, but individual
2 physicians are not generally making a
3 decision about one generic versus the other.
4 That decision happens at the pharmacy.

5 BY MR. ROTH:

6 Q. But Attachment C contains a
7 slew of generics on that list?

8 A. That's correct. Some of them
9 have contacts related to them. Some of them
10 don't. Some of those contacts relate to
11 marketing agreements that are really for
12 brand drugs.

13 Q. So how do you square your
14 testimony a minute ago that generics
15 generally don't detail with the fact that you
16 have a lot of promotional contacts in your
17 model for generic drugs?

18 MR. SOBOL: Objection.

19 A. I believe I just squared it. I
20 think a lot of those contacts relate to
21 marketing agreements.

22 BY MR. ROTH:

23 Q. And so if there's marketing
24 under a marketing agreement, that gets
25 attributed to the generic drug, even though

1 it may be different in kind than a branded
2 drug promotional visit?

3 MR. SOBOL: Objection.

4 A. No. The marketing of a
5 particular drug is identified, and if the
6 drug is sold by a defendant manufacturer,
7 even if it's detailed by a different
8 manufacturer, that gets counted in my model.
9 And then in Table 3, I take out those
10 marketing agreement related drugs.

11 So -- so it's -- the marketing
12 is associated with -- I mean, I look at
13 aggregate marketing, so it's all in the
14 aggregate marketing. But I do have a
15 mechanism for pulling out marketing that's
16 for someone else's drug.

17 BY MR. ROTH:

18 Q. So if that's the mechanism
19 you're using, how are any of these detailing
20 contacts being attributed to generic drugs in
21 your model?

22 MR. SOBOL: Objection.

23 A. I think you misunderstand the
24 nature of the model. The model uses
25 aggregate MMEs and aggregate detailing, so

1 there's not an attribution underneath that.

2 And furthermore, as we know,
3 that detailing for the brand drug will spill
4 over to the generic drugs too, and so it's
5 entirely appropriate that the model allows
6 that to happen.

7 Q. So maybe we're talking past
8 each other.

9 I understand the model works
10 that way.

11 A. Yeah.

12 Q. What I'm talking about, which
13 we'll get to later, is your Table 3 allocates
14 drugs to specific manufacturers, including
15 generic manufacturers, and I'm just trying to
16 understand how that works in a world where we
17 agree that generic drugs generally aren't
18 detailed.

19 A. So Table 3, it sits on top of a
20 somewhat more complicated analysis, but what
21 it in effect does is it takes the detailing
22 associated with each of those defendants and
23 treats it separately, depending on where we
24 are in the table.

25 So, you know, at the top for

1 Actavis, to the extent that Actavis has
2 detailing in my data, the row that says,
3 well, what would the damages look like or
4 what would impact look like if Actavis'
5 detailing was deemed to be lawful? Basically
6 we've taken out their detailing, out of --
7 we've left it in basically in a but-for
8 world. It happens because it's lawful.

9 So that's how -- that's how the
10 allocation works, is in Table 3, it's by
11 manufacturer.

12 Q. Okay. We'll get there.

13 A. Okay.

14 Q. But that's helpful.

15 If you look back at
16 paragraph 55, I mean, you acknowledge that
17 detailing is undertaken by the brand name
18 drugs in the class, typically peaks during
19 initial launch, and ceases shortly before or
20 after the AB-rated bioequivalent generic
21 drugs enter.

22 A. That's correct.

23 Q. And how does your model account
24 for detailing at different points of a
25 product's life cycle, close-to-launch

1 detailing versus the period right before
2 generic entry?

3 A. My model is an aggregate model,
4 so I'm looking across drugs in the entire
5 market, and those drugs are at different
6 stages in their life cycle. And so the
7 important input to my model is the level of
8 detailing, not where it is in the course of a
9 product's life cycle.

10 But we know that the bolus of
11 detailing happens for these new products, and
12 so that is incorporated into the data.

13 Q. So it's incorporated in the
14 sense that you'll see more contact at the
15 beginning of the life cycle than at the end
16 of the life cycle?

17 A. That's correct.

18 Q. But the detailing that happens
19 at the beginning of the life cycle could be
20 qualitatively different than the detailing
21 that happens at the end of the branded life
22 cycle.

23 Would you agree with that?

24 MR. SOBOL: Objection.

25 A. I don't know that to be true.

1 BY MR. ROTH:

2 Q. As an economist, I mean, when a
3 product is launched, you would expect more
4 detailing about clinical studies and things
5 designed to promote a new product that
6 physicians might be unaware of, right?

7 A. It may be that there is more of
8 that sort of baseline information at the
9 beginning.

10 Q. Right. And at the end of a
11 product's life cycle, when the generics are
12 about to come on the market, you might expect
13 the detailing to focus more on things like
14 price and availability and formulary status
15 and things of that nature, right?

16 A. I have seen no detailing
17 information that pertains to price. I can't
18 say that it never happens, but I've certainly
19 never seen that.

20 What that sort of -- what
21 you've just described here is on the one hand
22 saying, hey, there's this new drug early on,
23 and don't forget your old friend at the end,
24 something to that effect. Those -- those
25 differences are not relevant to the question

1 of does the detail generate more MMEs.

2 So for my purposes, I really
3 only want to understand does the detail
4 generate more MMEs. And again, because I'm
5 looking at the aggregate, the fact that some
6 drugs are ending and others are beginning,
7 that -- that sort of -- that mix, it may
8 change a little bit over time, but I'll be
9 looking across a set of drugs at different
10 stages.

11 Q. Okay. But what I described
12 might be relevant to the question of whether
13 the detailing was lawful, correct?

14 A. I don't know what you mean by
15 that.

16 Q. Right. So we've established
17 this, I think, but just to try it one more
18 time: Because your model is just focusing on
19 whether detailing impacts the aggregate
20 number of MMEs, you don't evaluate any
21 qualitative difference in the kind of
22 detailing that is occurring?

23 MR. SOBOL: Objection, asked
24 and answered.

25 ///

1 BY MR. ROTH:

2 Q. Is that a fair statement?

3 MR. SOBOL: Asked and answered.

4 A. I -- you had a "because" at the
5 beginning of that sentence, which doesn't
6 make sense to me. I am not looking at the
7 content of the detailing as we talked about
8 this morning. I am assuming the plaintiffs
9 will prove their case.

10 I understand that you think
11 differently and you're trying to probe
12 whether I've tried to disaggregate the
13 detailing.

14 I have not tried to
15 disaggregate the detailing by drug or over
16 time. It is possible to do that, but I have
17 not done that.

18 BY MR. ROTH:

19 Q. So in your direct model, just
20 like all MMEs are created equal, all
21 detailing contacts are created equal?

22 MR. SOBOL: Objection.

23 A. Again, I would acknowledge that
24 there's variation in detailing and that my
25 model captures the average effect.

1 BY MR. ROTH:

2 Q. And it captures the average
3 effect by treating each contact the same?

4 MR. SOBOL: Objection.

5 A. Well, I guess sort of an
6 average effect means that sort of
7 tautologically, I'm summing up all of the
8 effects.

9 BY MR. ROTH:

10 Q. Does your model account for
11 rivalrous marketing?

12 A. I'm so happy that we've gotten
13 back to this.

14 MR. SOBOL: That makes one of
15 us.

16 A. The aggregate model that I put
17 forth is intended to essentially obscure the
18 rivalrous marketing, so to the extent that
19 marketing only moves people from hydrocodone
20 to oxycodone or the other direction, whatever
21 it is, that will show up as a noneffect in my
22 model.

23 So I'm only looking at market
24 expansion because the question I care about
25 is market expansion.

1 BY MR. ROTH:

2 Q. I'm not sure I followed your
3 answer. So how does it show up as a
4 noneffect if you're including that contact in
5 your regression analysis, whether it was new
6 drug promotion or rivalrous marketing?

7 A. I think the way you're looking
8 at rivalrous marketing is a bit different
9 than the way I would look at it. And this
10 goes back to a conversation we had before
11 where I think there was a little bit of a
12 disconnect.

13 So it may well be that you go
14 to the detail and what you want to talk about
15 is why you're better than the other guy. But
16 still, what happens is you actually increase
17 the use of any product in this class.

18 So what I'm concerned about is
19 not the intent of the marketing but the
20 effect of the marketing. You seem focused on
21 the intent.

22 Q. I do. But now I think you've
23 helped me, and your answer is actually the
24 opposite of what I understood it to be
25 before.

1 When you say that rivalrous
2 marketing is a noneffect, what you mean is
3 you don't assess whether the marketing was
4 rivalrous or not, because in either case,
5 your view is it will potentially lead to
6 increased MMEs, so it gets counted?

7 MR. SOBOL: Objection, form,
8 asked and answered.

9 A. I am interested only in a
10 particular kind of impact, and that impact is
11 an increase in the number of MMEs. If there
12 is marketing that changes the drug people
13 take without affecting their MMEs, then I
14 ignore that.

15 Let's just say there's unlawful
16 conduct and you earn money off of it, but
17 it's really only because you've switched
18 brands. That, I'm not counting, so that's a
19 kind of rivalrous marketing effect that's not
20 being counted in my impact assessment.

21 I'm only concerned about market
22 expansion by definition. Economists can be
23 interested in both of those things, but for
24 my purpose, I'm only interested in market
25 expansion.

1 BY MR. ROTH:

2 Q. I'm just trying to understand
3 functionally how that happens.

4 So the reason you're saying
5 that is because you're only looking at the
6 delta, the change in MMEs, and so if there's
7 no change, then the rivalrous marketing
8 doesn't get counted? I'm just struggling
9 with the mechanics.

10 A. Sure. Let me try to explain.

11 If we had two drugs in the
12 market and we looked at their marketing
13 separately, we could ascertain whether your
14 marketing increases your sales, right, and --
15 and then what we wouldn't know is, is that
16 increase coming from new patients, or is it
17 coming from the decrease in someone else's
18 sales. So we could use a system kind of
19 analysis to show what's happening.

20 So people have done this in
21 prescription drugs. I know you've spent some
22 time with the literature, and they're curious
23 about when you increase your sales, does it
24 come at someone else's expense or are you
25 just growing the market. And in different

1 drug classes, those two things seem to
2 operate differently.

3 But if you were to add those
4 two drugs together and say, okay, for any
5 herpes treatment, what's the total effect of
6 marketing? Then what you would get is only
7 the market expansion effect. You would wash
8 out any of the market stealing because your
9 gain is my loss. And so those two things
10 would net out and you'd only get the net
11 result. So that's what I'm doing here.

12 Q. So the mechanics are because
13 it's an aggregate model that's aggregating
14 all contacts and aggregating all scripts, it
15 comes out in the wash if it's rivalrous?

16 A. Exactly. Rivalrous, again, my
17 definition of rivalrous is my sales come from
18 you and that those two things fully offset.

19 Q. Okay. But the detail itself is
20 still counted in the model, because you're
21 not actually looking substantively at the
22 detail to determine what happened?

23 MR. SOBOL: Objection.

24 A. That is correct. The detail is
25 still in the model, and where the rivalrous

1 piece shows up is that it dampens the
2 effectiveness of marketing that we measure.

3 BY MR. ROTH:

4 Q. Okay. We're finally on the
5 same page then.

6 How does your model account for
7 unbranded marketing?

8 A. Well, in two ways. In Model C,
9 I explicitly put in some of those events. We
10 can look at exactly which ones they are.

11 Q. I was saving this for later,
12 but we can --

13 A. I know, it sounds like an
14 after-lunch conversation, but the consensus
15 statement from the American Academy of Pain
16 Management and the American Pain Society, the
17 Federation of State Medical Boards
18 Guidelines, the JCAHO pain standards
19 released.

20 So these, I understand that
21 plaintiffs intend to prove they were
22 manipulated by the defendants. So I put
23 those explicitly in Model C.

24 And then as I describe Model B
25 and my rationale and the way I interpret the

1 turning points is that they -- that is
2 incorporating these many different events and
3 tactics.

4 Q. So the unbranded marketing is
5 captured by the way you do the breaks and the
6 way you test for these five events in
7 Model C, correct?

8 A. That's correct.

9 Q. But the unbranded marketing is
10 not captured in the detailing contacts you
11 use for your stock of promotion?

12 A. That's correct.

13 Q. How does your model account for
14 the peer-to-peer marketing that I think you
15 or Dr. Perri describes as a contagion
16 phenomenon in paragraph 25?

17 A. Yeah. So that phenomenon will
18 get picked up in marketing effectiveness,
19 because again, we're looking at aggregate
20 prescribing and not just the prescribing of
21 the targeted physicians.

22 So, you know, as -- we can go
23 back to our favorite paper by Datta and Dave,
24 they're looking at individual physicians.

25 It could well be, of course,

1 detailing physician A causes physician B's
2 prescribing to increase; they're not really
3 looking at that because they're only looking
4 within physician. But we, for the same
5 reasons that I can capture market expansion
6 appropriately, aggregating up across doctors
7 here allows me to capture that contagion
8 effect.

9 Q. We do agree, though, that at an
10 individual prescriber, individual detail
11 visit level, there could be variation in the
12 impact that visit has?

13 A. There may be variation in the
14 impact of detailing on an individual
15 prescriber and her network and my model will
16 average that, will generate a result that
17 captures the average.

18 Q. And we talked a little bit
19 earlier about some of the variability in the
20 way detailing occurs. I think I used the
21 pizza example.

22 Do you remember that?

23 A. I remember pizza.

24 Q. Okay. I want to come back to
25 that for a minute maybe because it's

1 lunchtime.

2 Not every detail visit occurs
3 the same way in terms of time spent and what
4 is disseminated from the pharmaceutical sales
5 representative to the doctor, correct?

6 MR. SOBOL: Objection, asked
7 and answered.

8 A. I would not disagree that
9 details can be different day of the week,
10 whether there's food involved, how much time.

11 BY MR. ROTH:

12 Q. And frankly, who is detailed,
13 because it could be a prescribing doctor or
14 it could be a nurse practitioner, it could be
15 some other healthcare professional in the
16 doctor's office, right?

17 A. Yes, that's correct.

18 Q. And does the IQVIA data you've
19 looked at distinguish between the target of
20 the detail?

21 A. It distinguishes between
22 office-based and hospital-based physicians,
23 but it does not distinguish by licensure as
24 you've just described.

25 And again, what I'm interested

1 in is the aggregate impact, and therefore,
2 the average across that variation is
3 appropriately subsumed in my analysis.

4 Q. Right. And because you used
5 the average, whether the sales rep makes
6 contact with the prescribing doctor and
7 spends 15 minutes discussing the virtues of
8 opioids or whether the sales rep quickly
9 speaks to a nurse practitioner to leave the
10 coffee mug will get treated the same as an
11 average in your model?

12 A. Yes. And that is appropriate
13 if you're interested in the aggregate effect.
14 If I were interested in comparing the
15 difference between a detail with pizza versus
16 a detail without pizza, then I would want to
17 look at them. But I'm only interested in the
18 aggregate effect.

19 Q. Are you aware that detailing
20 could be limited to simply providing
21 literature that contains information
22 contained in the package insert or approved
23 by the FDA in promotional materials?

24 MR. SOBOL: Objection.

25 A. I'm not exactly sure what you

1 mean by simply. I think we're getting into a
2 question about what and how will be proven to
3 be unlawful. And if the question is was
4 certain information omitted, then the fact
5 that the information that was provided was in
6 some way not challenged, to me, seems like it
7 could still be a problem.

8 But the larger issue is that I
9 think it's not appropriate to try to pull
10 these detail visits off one at a time. If
11 there was some messaging around the utility
12 of treating patients with opioids at an
13 earlier visit and these later visits are just
14 reminder visits, again, I'm not -- I'm not
15 trying to prove liability here, but to me as
16 an economist, it seems like they could well
17 be connected.

18 BY MR. ROTH:

19 Q. And they all count the same way
20 as the average?

21 A. All -- all details in my data
22 are included in the right-hand side, and they
23 produce an average effect, and then I back
24 out those particular ones deemed unlawful.

25 Q. And similarly, if the detail is

1 corrective messaging designed to dampen the
2 effects of some prior materials that FDA has
3 issued a warning letter on, those detail
4 visits get picked up by your data as well?

5 MR. SOBOL: Objection.

6 A. I think you need to understand
7 what the regression is doing. It is not just
8 saying sales are strictly promotional to
9 detailing. It's trying to look at that
10 effect, and, in fact, in the last period of
11 my three-period model, the effective
12 promotion is declining.

13 To the extent that there's
14 corrective messaging, that may be one of the
15 factors that is decreasing the effectiveness
16 of promotion, and so there are not MMEs
17 assigned to have been produced by that
18 detail.

19 BY MR. ROTH:

20 Q. Let me just ask a simpler
21 question: Yes or no, are details that are
22 simply designed to provide corrective
23 messaging included in your stock of
24 promotion?

25 MR. SOBOL: Objection, asked

1 and answered.

2 A. I really have no idea about
3 whether such details exist. My model
4 includes all detailing over the period from
5 1995 to 2018 based on the instruction that I
6 was given to consider that unlawful.

7 BY MR. ROTH:

8 Q. Okay. Without distinguishing
9 between the quality or extent of those
10 detailing visits?

11 MR. SOBOL: Objection, asked
12 and answered.

13 A. I do not distinguish among
14 those details, no.

15 BY MR. ROTH:

16 Q. And I think we talked about
17 this, but I'm not sure.

18 You don't differentiate between
19 which physician practice groups were targeted
20 by the details in your model?

21 MR. SOBOL: Objection, asked
22 and answered.

23 A. As I noted, my detailing
24 measure is national. It's aggregate. It
25 does not distinguish at a level below that.

1 BY MR. ROTH:

2 Q. Do you have any view as to
3 whether allegedly deceptive marketing is more
4 impactful than truthful marketing?

5 A. I think I do discuss this in my
6 report, and there's an economic theory
7 related to the profitability of fraud and
8 some evidence from other sectors that suggest
9 that for something unlawful to be undertaken
10 when lawful activities are possible, that it
11 must be more profitable because there's some
12 cost associated with matters such as this
13 one. And so that would suggest that that
14 kind of marketing must be more profitable
15 than marketing to other physicians.

16 I think this is -- it depends
17 on what assumptions we're making about the
18 intention and knowledge of the various
19 actors. So I think it could go either way.

20 Q. But within your model, within
21 the time periods of your model, you treat
22 each of the details equally because in your
23 view, you assume them all to be equally
24 unlawful at this point in time?

25 MR. SOBOL: Objection.

1 A. I am, as we've noted earlier,
2 operating on the assumption that the
3 defendants' conduct during the relevant
4 period was unlawful, and my model uses a
5 single measure of detailing and therefore
6 averages across allegedly lawful and unlawful
7 details.

8 BY MR. ROTH:

9 Q. Let's look back at Datta and
10 Dave because you asked to.

11 A. Okay.

12 Q. It's Exhibit 5, for the record,
13 and I -- can you turn with me to page 454.

14 A. Okay.

15 Q. So at the top of the page it
16 says: Thus, detailing plays a role in
17 educating providers about newer drugs and
18 their attributes and may have information
19 value early in a product's life cycle,
20 whereas later in the life cycle, its role can
21 be predominantly persuasive and chiefly
22 relegated to delivering samples and
23 reminders.

24 Do you see that?

25 A. I do.

1 Q. And then at the end of the
2 paragraph, they say: Because detailing can
3 affect both selective (brand centric) and
4 primary (market) demand under these views --
5 citation to Dave and Kelly, 2014 -- the
6 question cannot be resolved based on theory
7 alone, and empirical evidence needs to bear
8 upon the question.

9 Do you see that?

10 A. Yes. Just to be clear, what
11 they're talking about there is the welfare
12 effects of marketing, and that is a separate
13 question than the one that we're discussing
14 here.

15 Q. It's the same issue that we've
16 been going around on, right? You're not
17 looking at the welfare, you're not looking at
18 the quality; you're just looking to see if
19 there's a correlation between detailing
20 visits as a stock of promotion against
21 MMEs --

22 MR. SOBOL: Objection, asked
23 and answered.

24 BY MR. ROTH:

25 Q. -- on an aggregate basis.

1 MR. SOBOL: And there's a lot
2 in there, so be careful.

3 A. I just want to say that the
4 sentence that you just said had a number of
5 pieces that I think are entirely unrelated to
6 one another.

7 So a welfare analysis is -- is
8 an economic analysis that is based on the
9 theory of demand and is -- is specific to
10 this idea that consumers make rational
11 decisions, so what he's talking about in this
12 sentence really has nothing to do with this
13 question about the quality of detailing or
14 not.

15 That sentence is not connected
16 to the "thus detailing plays a role in
17 educating providers." They have a marketing
18 theory that you related before about what
19 happens early versus late in the life cycle,
20 but this last sentence is really just about
21 are consumers better off because of
22 promotion, or not.

23 And the way economists do a
24 welfare analysis like this one is to assume
25 that consumers are perfectly informed and

1 perfectly rational and that if marketing is
2 only about stealing market share and it
3 doesn't increase the size of the market, that
4 consumers are worse off. But if it does
5 increase the size of the market, that
6 consumers are better off.

7 As a health economist and a
8 person who sits in the School of Public
9 Health, I would like to say that if this
10 marketing was only about market expansion, as
11 it seems to have been quite a bit about
12 market expansion, I don't think consumers are
13 better off as a result. They're just
14 operating from a totally different framework.
15 BY MR. ROTH:

16 Q. Okay. Let's go back to the
17 first sentence, which I think was more
18 relevant.

19 They theorized that based on
20 their results, there is a difference between
21 marketing early in the life cycle and
22 marketing later in the life cycle?

23 A. They are positing a theory
24 about the intent of marketing and the focus
25 of marketing, but they do not say anything

1 about whether that generates more sales at
2 the beginning or more sales at the end.

3 There again, they're really
4 focused on this are you getting a new unit
5 from a patient who hasn't been treated versus
6 a new unit from a rival.

7 Q. Got it.

8 MR. ROTH: I think now is a
9 decent time to take lunch.

10 THE WITNESS: Okay.

11 THE VIDEOGRAPHER: The time is
12 12:09 p.m. We're now off the record.

13 (Recess taken, 12:09 p.m. to
14 12:51 p.m.)

15 THE VIDEOGRAPHER: The time is
16 12:51 p.m. We're back on the record.

17 BY MR. ROTH:

18 Q. Professor Rosenthal, before
19 lunch we were talking about how your stock of
20 promotion just includes detailing visits
21 multiplied by a coefficient as a single
22 variable; is that correct?

23 A. Just to be perfectly clear,
24 it's a cumulative sum of detailing in one
25 period -- all the preceding periods with the

1 depreciation rate applied.

2 Q. Are you aware that there are
3 other economic studies of the effect of
4 marketing that model detailing using multiple
5 variables?

6 A. I know that detailing has been
7 modeled as both a stock and a flow, and both
8 at the same time. I don't know if that's to
9 what you're referring.

10 Q. It may be.

11 (Whereupon, Deposition Exhibit
12 Rosenthal-7, 2002 Azoulay Publication,
13 was marked for identification.)

14 BY MR. ROTH:

15 Q. So let me mark as Exhibit 7 the
16 Azoulay study, Do Pharmaceutical Sales
17 Respond to Scientific Evidence.

18 Do you have that in front of
19 you?

20 A. I do.

21 Q. And the Azoulay study is a
22 document that I think you quote from and --
23 in your report and rely on in your
24 attachment.

25 A. That's correct.

1 Q. So if you'd turn with me to
2 page 558, and if you have to look before or
3 after to answer this question, feel free, but
4 did Azoulay run a time series regression in
5 this study similar to yours in this case?

6 MR. SOBOL: Objection to the
7 form.

8 A. Yes. I should look just to be
9 sure. He's effectively doing a panel model,
10 so he has multiple antacid drugs, and looking
11 at them over time, so I would call it a panel
12 model as we discussed this morning.

13 BY MR. ROTH:

14 Q. Okay. And if you look at
15 page 558, there's a description of his
16 variables. And it looks like in his
17 description he has three variables related to
18 the flow of detailing and then also a stock
19 of detailing variable.

20 Do you see that?

21 A. Yes, I do.

22 Q. And then he actually also
23 models the flow of journal advertising and a
24 stock of journal advertising.

25 A. Yes, that's correct.

1 Q. And in the flow of detailing
2 variables, he has variables both for the flow
3 of monthly detailing minutes for a drug and
4 the flow of monthly detailing minutes for
5 competitors of the drug, and then a third
6 variable for the flow of monthly detailing
7 minutes for the firm selecting the drug.

8 Do you see that?

9 A. Yes.

10 Q. So he's, it looks like,
11 measuring the time and length of details in
12 his model?

13 A. Yes, that -- excuse me. That
14 is what it appears he's doing, and I would
15 note, of course, the purpose of his model is
16 different. We talked about the fact that
17 he's doing a panel data model, so of course
18 he has own and other detailing. That's --
19 the second detailing is for competitors.

20 Q. Well, the purpose of his model
21 is to determine whether doctors respond to
22 scientific evidence; is that right?

23 A. That's one of his purposes.
24 That's the title of his -- of his paper, but
25 he's -- he's looking at detailing and

1 scientific evidence at the same time in this
2 model.

3 Q. And he's trying to see how
4 doctors respond to both sources, detailing as
5 well as clinical studies and scientific
6 articles?

7 A. Yes. I'm just saying that
8 because he's using a product-level model and
9 he's interested in how drugs are competing
10 with one another, he naturally includes
11 different variables.

12 Q. And that's not something you've
13 done in this case?

14 MR. SOBOL: Objection.

15 A. That was not my question of
16 interest, and therefore, I've selected a
17 model that is appropriate to the question
18 that I was assigned, which is what is the
19 aggregate impact of marketing of opioids.
20 BY MR. ROTH:

21 Q. Okay. And then I'm going to
22 mark as Exhibit 8 a study by Dr. Ernst Berndt
23 and others, Information, Marketing and
24 Pricing in the U.S. Antiulcer Drug Market.

25 (Whereupon, Deposition Exhibit

1 Rosenthal-8, 2001 Berndt et al
2 Publication, was marked for
3 identification.)

4 BY MR. ROTH:

5 Q. Do you have the Berndt study?

6 A. I do.

7 Q. And if you look at page 102 --

8 A. Sorry. Oh, there it is. I
9 couldn't find the page numbers for a moment.

10 Yes, go ahead.

11 Q. It looks like Professor Berndt
12 and his colleagues are also doing an
13 econometric regression to look at the impact
14 of marketing for drugs in this study; is that
15 correct?

16 A. Yes. Again, they have a panel
17 model for the same drugs. I believe,
18 actually, they're the same data. Ultimately,
19 I know that Dr. Berndt worked with
20 Dr. Azoulay.

21 Q. On page 102, in the first
22 column towards the bottom, it says: In terms
23 of marketing efforts, we distinguish three
24 channels: the minutes of detailing to
25 physicians, the number of pages of medical

1 journal advertising, and the target rating
2 points of direct-to-consumer advertising.

3 Do you see that?

4 A. Yes, I do.

5 Q. So in this study as well, they
6 were looking at variables to measure the
7 magnitude of marketing, whether by minutes or
8 by pages or by rating points.

9 A. Yes, they used a different
10 measurement.

11 Q. Okay. If you turn to page 51
12 of your report -- I'm sorry, paragraph 51 of
13 your report. It's the section Data Source
14 and Trends, if that helps, on page 34.

15 A. Yeah, got it. Sorry, I just
16 need to move the clip. Okay.

17 Q. So you're describing the data
18 you used, and you say: The primary data I
19 used for the direct analysis come from the
20 data tracking and consulting firm IQVIA.

21 Do you see that?

22 A. I do.

23 Q. And then you describe the data:
24 IQVIA maintains a number of data streams that
25 capture information on sales, promotion and

1 other statistics by individual drug over
2 time.

3 And then you say that
4 specifically, the specific products you
5 incorporate are the National Prescription
6 Audit and the Integrated Promotional
7 Service's data.

8 Do you see that?

9 A. Yes.

10 Q. So the NPA and IPS.

11 Does IQVIA have other marketing
12 or sales data than the NPA or IPS that you
13 could have used in your models?

14 MR. SOBOL: Objection.

15 A. Well, the National Prescription
16 Audit data, those are sales data. Those are
17 retail sales, so I just wanted to be clear
18 those are not the promotional data.

19 The promotional data are the
20 IPS data. And I believe the IPS data, which
21 as we discussed earlier today, do
22 traditionally include samples, journal
23 advertising and direct-to-consumer
24 advertising. I believe that that is their
25 main product. I can't be sure that they

1 don't have another promotional product. I'm
2 not aware of one.

3 BY MR. ROTH:

4 Q. And as I think we talked about
5 earlier, the IPS data is survey based?

6 A. That's correct.

7 Q. And I think you said you didn't
8 run models with samples or journal spend data
9 given gaps in the data?

10 A. Because there were big gaps in
11 the data, yes, I did not.

12 Q. Have you used those data
13 sources in other cases where you had more
14 robust data?

15 A. Yes, I have.

16 Q. Including in the Neurontin
17 case, I think?

18 A. We included professional
19 journal articles because there were -- there
20 were monthly data available in those.

21 Q. Are you aware of any other
22 sources of data regarding prescriber-specific
23 promotion?

24 A. I am not specifically, but it
25 depends a little bit on what you mean. As

1 you perhaps know, the federal government has
2 required that pharmaceutical manufacturers
3 report certain transfers of value at the
4 physician level, and those are publicly
5 available, I think, starting 2014. I may
6 have the year wrong.

7 So for some years, for some
8 types of activities that are clearly
9 marketing, there are some physician-level
10 data, and I describe some of the papers that
11 use those.

12 Q. And that's not a dataset you
13 considered using in this case because it
14 started late or --

15 A. It starts very late, yes.

16 Q. Okay. Have you heard of
17 something called the Scott-Levin Personal
18 Selling Audit?

19 A. Yes, Scott-Levin doesn't exist
20 anymore. It's part of IQVIA.

21 Q. And what years does that audit
22 data cover?

23 A. I don't believe it's possible
24 to obtain those data anymore since IQVIA
25 purchased Scott-Levin, which must be at least

1 five years ago.

2 Q. So you can't even get old data
3 from Scott-Levin? IQVIA won't allow
4 purchase?

5 A. I don't recall all the details,
6 but I do recall -- IMS and Scott-Levin had
7 these competing products, and at different
8 times I've used Scott-Levin data and there
9 were some differences. And at one time I
10 tried to get the Scott-Levin data because I
11 preferred it for whatever the project was. I
12 don't recall what the difference was, but I
13 know that I did actually try to get the
14 Scott-Levin data and was unable to.

15 Q. Did you consider any other
16 sources of prescriber-specific promotion data
17 beyond IQVIA or maybe Scott-Levin for this
18 case?

19 A. Well, in general, as I noted
20 earlier, I and my staff asked counsel to
21 identify any materials in discovery that
22 would help us with physician-level detailing,
23 and we did not find anything that was
24 comprehensive that we could use.

25 Q. And when you asked counsel to

1 help you identify that data, did you receive
2 like the full suite of data produced in the
3 case? Like what specifically did you get
4 that you looked through to find data that was
5 usable?

6 A. My staff had access to
7 everything that was produced in the case, and
8 as you know, it's a rather large, complex
9 case, so we made those requests through
10 counsel for help navigating. And I believe
11 that everyone looked to their best ability to
12 find the data that I had asked for.

13 Q. And when you say your staff,
14 you're referring to Greylock McKinnon?

15 A. Excuse me. Yes. Greylock
16 McKinnon.

17 Q. Did you work with Compass
18 Lexecon at all on your report or your models?

19 A. I attended meetings with them
20 and conversations. I wouldn't say I worked
21 with them directly.

22 Q. So you had the Greylock
23 McKinnon team working under you, and that was
24 separate from Professor Cutler and Gruber and
25 McGuire's Compass Lexecon team?

1 A. That's correct.

2 Q. Do you know whether your teams
3 interacted with each other?

4 A. Yes, they did.

5 Q. Do you know how frequently?

6 A. I do not.

7 Q. And I think we talked about
8 this earlier, but let me just ask you an
9 open-ended question.

10 What data did you review that
11 was -- sorry, strike that.

12 Did you review any data
13 produced by the manufacturers that was
14 prescriber-specific promotion data?

15 A. I can't recall whether I
16 actually reviewed prescriber-specific data.
17 I requested it, and what I requested was
18 determined not to be available. I'm not sure
19 if I saw any pieces of data.

20 I did see marketing documents
21 and product P&Ls that referred to marketing
22 expenditures specifically, but that's not
23 really what you're asking about.

24 Q. And when you say the data was
25 determined not to be available, was that a

1 determination you made or that someone at
2 Greylock made?

3 A. Well, again, I made a very
4 specific request for detailing data,
5 promotional data over time and across
6 physicians, and I was told that it didn't
7 exist.

8 Q. But you did have access to some
9 of the marketing budgets which are cited in
10 your report I think in footnote 70?

11 A. I could check that, but, yes, I
12 did. As I mentioned, I did review marketing
13 reports and product and loss -- profit and
14 loss statements by product.

15 Q. And did you ask for a
16 comprehensive set of all of the marketing
17 budgets produced in the case?

18 A. I did, and I don't believe I
19 used them systematically like that, but I did
20 ask for marketing budgets for all of the
21 defendants.

22 Q. Did you consider using the
23 marketing budgets to measure marketing by
24 dollars spent as opposed to through the IQVIA
25 data?

1 A. Yes. And as you know, because
2 there's some missing data for OxyContin, I do
3 actually use the marketing budgets to help me
4 interpolate. But it's not a -- I can't --
5 it's not monthly data, and -- and I don't
6 have complete marketing budgets for every
7 product for every time period, so it's simply
8 impractical to use that as an alternative.

9 Q. Did you review prescriber-level
10 prescription data?

11 A. No, I did not have any
12 prescriber-level prescription data.

13 Q. Did you ask for that?

14 A. Because the rate-limiting step
15 is the promotional data, I'm not sure I asked
16 for it. I asked for the promotional side.

17 Q. But for the other side of your
18 model, the MMEs, you could have ostensibly
19 used prescription data for that, right?

20 MR. SOBOL: Objection.

21 A. That would not make sense to
22 have an aggregate independent variable and a
23 disaggregated dependent variable. It would
24 have -- it would have given nonsensical
25 results.

1 BY MR. ROTH:

2 Q. Got it.

3 So when you say the
4 rate-limiting side --

5 A. Yes.

6 Q. -- you only had aggregate data
7 on the promotion side, so you wanted to use
8 aggregate data for everything?

9 A. Yes. As I mentioned earlier, I
10 considered whether it was possible to take
11 this approach, and I knew that the problem
12 was in quantifying promotion at the
13 individual physician level.

14 Q. Did you have access to data
15 about payments to key opinion leaders?

16 A. Again, I believe that some of
17 those payments are tracked in the marketing
18 documents that I looked at. Right now I can
19 mostly think of the ones that go to
20 organizations rather than individual key
21 opinion leaders. I believe some of the other
22 experts examined some of those payments, but
23 I did not directly.

24 Q. And you anticipated my next
25 question. So you've also seen data about

1 payments to pain advocacy organizations, it
2 sounds like?

3 A. Yes. And again, I think I cite
4 a few examples of those. But if you can't
5 track something systematically over time, you
6 can't include it in a statistical model like
7 this one.

8 Q. So if I understand your
9 testimony, you did not have access to
10 promotion data that was disaggregated by drug
11 manufacturer and geography?

12 MR. SOBOL: Objection.

13 A. I don't think that's -- well,
14 it's not wrong, but it's not right either.

15 BY MR. ROTH:

16 Q. It's too broad.

17 You did not have, on a global
18 basis for all manufacturers, disaggregated
19 promotion data by drug and geography?

20 MR. SOBOL: Objection.

21 A. My data allow me to
22 disaggregate by drug, by defendant. And as
23 we talked about earlier, the IQVIA data make
24 it possible to disaggregate by specialty.

25 I cannot disaggregate by

1 geography or by physician.

2 BY MR. ROTH:

3 Q. Why did you believe it was
4 appropriate to use a national model?

5 A. Again, the question at hand is
6 an aggregate question. The question is to
7 what extent did the conduct of these
8 defendants affect the expansion of the use of
9 opioids in the United States and in the
10 specific bellwether counties.

11 And ultimately, marketing is a
12 national phenomenon. I believe the most
13 reliable way to estimate the effect of
14 marketing on sales is to do so at the
15 national level. It smooths out variability
16 in the data in ways that make the analysis
17 more likely to show a true effect.

18 It also overcomes certain data
19 challenges that we've been talking about
20 where if we only focused on those physicians
21 who were detailed versus those who were not,
22 we might get the wrong results.

23 So in sum, the aggregate
24 analysis in my mind is the most reliable way
25 to estimate the impact of the alleged

1 misconduct.

2 Q. If you did not use aggregated
3 national data, would there be more
4 variability in the data that make it more
5 likely there would not be a true effect shown
6 from promotion?

7 MR. SOBOL: Objection.

8 A. Anytime we disaggregate data,
9 we will increase the amount of variability,
10 and that creates statistical noise which can
11 essentially overwhelm the effects.

12 BY MR. ROTH:

13 Q. Did you test your hypothesis
14 that marketing is national in scope by
15 comparing the impact of detailing stock
16 across geographies?

17 MR. SOBOL: Objection.

18 A. It's -- I began the analysis on
19 the premise that this was a national campaign
20 of misinformation, allegedly, and so an
21 aggregate model is the right place to begin.

22 To the extent that there's
23 geographic variation, it would nonetheless be
24 true that the aggregate effect would capture
25 all of that variation.

1 In all of the instances where
2 we have talked about variation today, that
3 variation is appropriately subsumed in my
4 model. I do show an average effect, but that
5 is what is meaningful for constructing
6 aggregate impact.

7 BY MR. ROTH:

8 Q. Do you have any opinion as to
9 what is causing the geographic disparity in
10 the number of opioid shipments, given your
11 view that the marketing campaign was national
12 in scope?

13 MR. SOBOL: Objection, scope.

14 A. The geographic variation in
15 opiate prescribing and deaths is really the
16 subject of Professor Cutler's report. I do
17 not have an independent opinion on that
18 question.

19 BY MR. ROTH:

20 Q. But you are aware from studies
21 and data that the opioid issues affect
22 certain geographies of this county more than
23 others?

24 A. Yes, and I believe Professor
25 Cutler addresses that directly in his report.

1 Q. That's not an issue that you've
2 studied or have an opinion on?

3 A. That's correct.

4 Q. If you look at paragraph 61,
5 we've finally gotten to your equation. And
6 can you just confirm, I don't believe this
7 was changed by your errata, although I saw
8 some equations did change so --

9 MR. SOBOL: That's my copy.

10 I'm kidding. Actually, I think it is.

11 A. Just checking, myself. I think
12 it's in the appendix that the equations were
13 changed, yeah. They're all in Attachment D,
14 yeah.

15 BY MR. ROTH:

16 Q. So this equation on page 43, Q_t
17 equals --

18 A. Checking your Greek.

19 Q. -- alpha -- no epsilon?

20 A. That's alpha.

21 Q. Alpha. I thought it was. Q_t
22 equals alpha plus -- why don't you just say
23 it in words, because if I try, I'm going to
24 massively fumble it.

25 A. We could say it in actual

1 words. So Q is the quantity of opioid MMEs
2 for a particular month. Alpha is just the
3 constant term. That's just the intercept. S
4 prime of t is -- this is the -- in this case,
5 it is the stock of detailing. Beta is the
6 coefficient on that, just using the standard
7 for doing matrix algebra in reverse.

8 So -- and then X is the vector
9 of other factors. So in Model C, right, it
10 includes those dummy variables in addition to
11 price. And then e is the error term. And
12 gamma, sorry, is the coefficient on those X
13 variables.

14 Q. And in terms of the other
15 factors variable, the only things being
16 picked up there are price and then the
17 Model C events?

18 A. That's correct.

19 Q. And essentially what this
20 equation allows you to do is plot total
21 opioid MMEs over time against your stock of
22 detailing over time?

23 A. I guess I don't know what you
24 mean by "plot." This equation is intended to
25 represent the regression line that is being

1 determined by the statistics, which
2 essentially looks at the variance and
3 covariance of the underlying valuable --
4 variables to ascertain what that relationship
5 would be to calculate the alpha, beta, gamma.

6 So I guess plot is one way of
7 thinking about it, but it's in
8 multidimensional space, so...

9 Q. My mathematical mind is more
10 limited than yours --

11 A. Okay.

12 Q. -- so I used the term "plot."
13 I apologize if that's too narrow.

14 A. That's okay.

15 Q. What is a stock of detailing?

16 A. Well, stock of detailing is
17 like a stock of anything else, that it's
18 cumulative and it has a depreciation rate so
19 that we can ascertain how the cumulative
20 effects relate to things that happened in the
21 distant past versus the near past.

22 Q. And why did you decide to use a
23 stock instead of just the number of contacts?

24 A. The stock of detailing -- I
25 know you've gone over a couple of papers, but

1 if you look across the literature, probably
2 about half of them use the stock of
3 promotion.

4 It's conceptually appealing
5 because the idea that you don't just forgot
6 something because you were detailed two
7 months ago, that makes sense, that detailing
8 in one period would have effects in a later
9 period. So that's the main reason for doing
10 it.

11 Q. It's true, then, that your
12 stock of promotion is a calculated value in
13 your model; it's not some observable number
14 out there in the world?

15 A. I'm not 100% sure what you mean
16 by that, but -- so the stock is -- it's
17 observable by adding up things that are
18 observable.

19 The depreciation rate is
20 estimated in the context of the model using a
21 specification test, so that part, you know,
22 again, it comes from the underlying data, but
23 it is estimated.

24 Q. Okay. And then in
25 paragraph 62, you say: Detailing contacts

1 were entered into the model as a stock,
2 including the number of current contacts and
3 the depreciated value of past contacts.

4 Do you see that?

5 A. Yes.

6 Q. And what does the word
7 "depreciated" mean to you?

8 A. Depreciated in this context is
9 multiplied by one minus the depreciation
10 rate, which I know we're getting to this. In
11 some cases it inflates the stock, and in some
12 cases -- well, it doesn't inflate the stock
13 per se, but it inflates past promotion versus
14 deflates it, yes.

15 Q. In general, though,
16 depreciation means reduce or diminish the
17 effect, right?

18 MR. SOBOL: Objection.

19 A. I think if you look it up in
20 the dictionary, it would do that, but we
21 think about negative interest rates even
22 though we think about interest rate just
23 literally being something that increases the
24 value of your asset, we can have negative and
25 positive interest rates by the same token.

1 BY MR. ROTH:

2 Q. Your coefficient on the stock
3 of detailing actually assumes the effect of
4 detailing increases over time?

5 MR. SOBOL: Objection.

6 A. I don't know what you mean
7 by -- when you say assumes, because it's
8 empirically estimated, but, yes, it is
9 consistent with the idea that past promotion
10 increases in effect over time.

11 BY MR. ROTH:

12 Q. So as time goes on from that
13 detail visit, the impact just gets stronger
14 and stronger in your model?

15 MR. SOBOL: Objection.

16 A. As you know, my model is
17 estimating the relationship between promotion
18 and sales for an addictive good, and so what
19 we're saying is let's say promotion caused
20 them -- the physician to write a hundred MMEs
21 in a prescription today, as the patient gets
22 more tolerant, not only do they continue
23 writing that prescription because the patient
24 comes back, but also the dose goes up. So
25 that is really what the negative depreciation

1 rate is about here.

2 BY MR. ROTH:

3 Q. So is your suggestion that the
4 doctors are addicted to writing
5 prescriptions?

6 MR. SOBOL: Objection.

7 A. I didn't say that.

8 BY MR. ROTH:

9 Q. So when you say it's the
10 addictiveness, your suggestion is because the
11 patient may become addicted, the doctor is
12 going to continually ratchet up the dosage
13 for that patient?

14 MR. SOBOL: Objection.

15 A. You make it sound like the
16 opioid epidemic is speculative. It is
17 clearly true that patients who started on a
18 particular dose of opioids get higher and
19 higher doses. That has -- that is just
20 common knowledge, and other experts have
21 opined on that.

22 And so it is a fact of the
23 matter that some patients will require
24 escalating values in terms of the number of
25 MMEs, whether they're addicted or not, and

1 then also it is true that some of those
2 patients will become addicted. I think
3 there's no question in the literature about
4 whether prescribed opioids cause addiction.
5 So that is true.

6 And the fact of the matter is
7 that I'm not describing physician behavior as
8 addictive; but if those patients come back to
9 their physician and say, "My pain is getting
10 worse, I need another prescription," then in
11 some instances it will be filled.

12 BY MR. ROTH:

13 Q. What percentage of patients
14 need escalating doses of opioids?

15 MR. SOBOL: Objection, scope.

16 A. I'm not a clinical expert. My
17 analysis is entirely empirical. If this were
18 not happening, my analysis would not find
19 that these MMEs are inflating over time in
20 the way they are.

21 BY MR. ROTH:

22 Q. I know you're not a doctor, so
23 I'm just trying to understand, like what --
24 you say it's common knowledge.

25 What basis in science or

1 literature do you have to opine that the
2 addictiveness of opioids means that doctors
3 are prescribing higher and higher dosages to
4 their patients?

5 MR. SOBOL: Objection, asked
6 and answered.

7 A. If you look at Figure 3, this
8 is where I empirically demonstrate what's
9 happening with the strength --

10 MR. SOBOL: Page?

11 THE WITNESS: Oh, sorry.

12 Page 37.

13 BY MR. ROTH:

14 Q. Right. That's on an aggregate
15 basis. I asked you a different question.
16 With --

17 A. No, no, no. I'm sorry, but the
18 aggregate basis means that the average MMEs
19 per prescription is escalating at this very
20 high rate. That means that some large number
21 of patients under it -- for it to increase at
22 this rate, it cannot be that just a handful
23 of patients are getting more.

24 Q. It could just be, though, that
25 stronger drugs are prescribed. It doesn't

1 mean that a specific patient is getting
2 higher and higher doses because of the
3 addictiveness of opioids.

4 MR. SOBOL: Objection.

5 A. I do not derive that -- these
6 data really show that higher and higher doses
7 of MM- -- of opioids are being prescribed. I
8 mean, that's just literally what they show.
9 The MMEs per prescription is increasing.

10 So that is showing that --
11 whether it's addiction or not, that patients
12 are getting higher and higher doses. That
13 mechanically will have the effect of making
14 it look like past promotion is suddenly more
15 effective today than it was yesterday.

16 BY MR. ROTH:

17 Q. And so, in effect, your
18 depreciation rate is an appreciation rate in
19 your model.

20 MR. SOBOL: Objection.

21 A. You may use that term. I think
22 it's more standard to call it a depreciation
23 rate. Also, as you know, I estimate multiple
24 models, and they don't all have a negative
25 depreciation rate.

1 BY MR. ROTH:

2 Q. What do your models say about a
3 single detailing visit in January 1995 with
4 regard to its impact today?

5 MR. SOBOL: Objection.

6 A. Can you explain what you mean
7 by that?

8 BY MR. ROTH:

9 Q. Yeah.
10 So the way your stock of
11 promotion is calculated, it keeps
12 aggregating. So would a visit in
13 January 1995 still be growing in impact in
14 your model?

15 A. In the fact -- in the models
16 with the negative depreciation rates, the
17 past promotion continues to grow, yes.

18 Q. And at what point does it reach
19 its maximum impact?

20 A. Well, I think you should not
21 try to extend the analysis out of sample.
22 Again, what I show in my model is while on
23 average, because I estimate a single negative
24 depreciation rate, we see this negative
25 depreciation rate, but we also find that the

1 effectiveness of promotion is falling.

2 And so while the stock may be
3 increasing, its effectiveness is decreasing.

4 Q. Yeah, and we'll get to the
5 other adjustments. I just want to talk about
6 the depreciation rate first.

7 So under your model, the
8 detailing that happens today is 8.3% more
9 impactful next year than it is today?

10 MR. SOBOL: Objection.

11 Objection.

12 A. For a given quarter, after a
13 year, the appreciation is 8.3%, yes.

14 BY MR. ROTH:

15 Q. And after ten years, detailing
16 that happens today would be 223% more
17 impactful than it was today?

18 A. I think you'd have to give me a
19 calculator, but I'm willing to trust your
20 math.

21 And just to be clear, it's not
22 exactly impactful because, again, you have to
23 recognize that the coefficient on promotion
24 is changing over this same period, and
25 because that -- that coefficient is dropping,

1 we're actually seeing reductions in sales.

2 Q. You agree that an appreciating
3 depreciation rate is at odds with the usual
4 marketing literature in economics?

5 MR. SOBOL: Objection.

6 A. I don't know that it's at odds
7 with the underlying theory of marketing.
8 Because this is an addictive good, I think
9 it's a very different set of circumstances.

10 Usually we do see depreciation
11 falling, but I would note also that this is a
12 special case, as we've talked about many
13 times today. I'm interested in this entire
14 market and not one drug.

15 And so usually when the
16 marketing literature is looking at this,
17 they're looking at an individual drug, maybe
18 even an individual physician. And here we're
19 really talking about the growth of an entire
20 set of practices around the use of opioids.

21 BY MR. ROTH:

22 Q. You say in your report: A
23 negative depreciation rate indicates that the
24 stock of promotion grows over time.

25 Correct?

1 A. Yes.

2 Q. And then you say: This
3 prediction may be at odds with the usual
4 marketing literature.

5 A. Yes. But I want it to be
6 clear, however, that it's not a theoretical,
7 the theory that I've just described, whereby
8 the role of addiction is entirely consistent
9 with a negative depreciation rate.

10 Q. And in your report, where you
11 say that, you've got a footnote and you cite
12 to Perri's report?

13 A. Yes.

14 Q. And you quote him in saying:
15 Additionally, because prescription opioids
16 may result in tolerance, dependence, and/or
17 addiction, the overall demand for opioids is
18 distorted by pharmaceutical marketing aimed
19 at increasing the use of these drugs. I
20 refer to this as a distortion because,
21 whether due to tolerance, dependence, or
22 addiction, some patients who use opioids
23 require and/or seek more opioids over time.

24 Did I read that correctly?

25 A. You know, I thought I saw that

1 correct footnote, and then I was looking at
2 the wrong one.

3 Q. Sorry. It's page 49, 103.

4 A. 49.

5 Yes.

6 Q. And based on that statement,
7 you believe that a negative depreciation
8 rate, although at odds with the usual
9 marketing literature, is perfectly consistent
10 in this case?

11 A. Just to be clear, I'm not
12 relying on Dr. Perri for my understanding
13 that opioids are addictive. I'm relying on
14 the broad facts of this case, my knowledge in
15 public health, and that is the reason why I
16 think, while marketing studies that have
17 looked at other goods have not found this, it
18 is entirely theoretically consistent that we
19 would find a negative depreciation rate here.

20 Q. Have you looked at marketing
21 studies relating to other addictive goods?

22 A. I don't know of any other
23 marketing studies related to addictive goods.

24 Q. Tobacco?

25 A. Yes, I have -- I'm certainly

1 familiar with the tobacco literature. That
2 literature, as you may know, focuses largely
3 on taxes and the effect of a marketing ban in
4 terms of broadcast advertising.

5 I don't know that the
6 literature has looked at the stock of
7 promotion at all.

8 Q. What about marketing literature
9 related to alcohol?

10 A. I have not seen any of that
11 literature, no.

12 Q. What about marketing literature
13 related to marijuana?

14 A. I --

15 MR. SOBOL: Wait. Is that
16 addictive?

17 THE WITNESS: Wait, is there
18 marketing? But now, you're right,
19 there may be a market.

20 I would be interested to know
21 if such literature exists. I'm not
22 familiar with any literature like
23 that.

24 BY MR. ROTH:

25 Q. Okay. As you sit here right

1 now, do you know of any literature, whether
2 related to nonaddictive or addictive
3 products, that has a negative depreciation
4 rate?

5 A. I cannot point to any other
6 study, no.

7 Q. Let's look at the Datta and
8 Dave study again. So if you look at page --

9 A. Sorry, I lost Datta and Dave.

10 Q. Sorry, it's okay.

11 A. Yeah. Okay. I got it.

12 Q. Page 457, footnote 23.

13 Do you see that?

14 A. Yes.

15 Q. So in this study, it says: We
16 chose to rely on the literature for fixed
17 estimates of the depreciation rate rather
18 than estimate it as an unknown parameter.

19 A. Yes.

20 Q. And they say: An unbiased
21 estimate of the depreciation rate would
22 require a detailed structural modeling of
23 promotion and prescription behaviors, without
24 which it would be difficult to disentangle
25 the coefficient of the detailing stock from

1 the depreciation rate.

2 And there's then a cite to
3 Iizuka and Jin.

4 Do you see that?

5 A. I do.

6 Q. And in what way did you
7 structurally model prescription behaviors in
8 your model?

9 A. Well, I followed the same
10 practice that Professor Berndt and others
11 have used, which in effect simultaneously
12 estimates the two parameters. It's not,
13 strictly speaking, a structural model. It
14 really requires that we reestimate the model
15 with a whole range of estimates and then see
16 which one has the best fit. It's an
17 alternative approach to the structural
18 modeling approach.

19 Q. Datta and Dave go on to say:
20 Prior research on consumer behavior suggests
21 that advertising effects fully depreciate
22 within six months to a year, consistent with
23 decay rates of 0.1 to 0.2, which have also
24 been found to apply to pharmaceutical
25 advertising.

1 Do you see that?

2 A. I do.

3 Q. Okay. And then --

4 A. I would note that Professor
5 Berndt's article that you shared with me
6 earlier finds a depreciation rate of zero,
7 and he concludes there and elsewhere that
8 it's consistent with our understanding that
9 pharmaceutical marketing is long-lived
10 because of the habit formation, so there's
11 clearly some disagreement in the literature
12 about what's the right answer.

13 Q. Right. But he has no
14 depreciation rate. He doesn't have an
15 appreciation rate in his study.

16 A. The difference between zero and
17 a small negative is -- they're both kind of
18 getting at the same notion, which is that
19 marketing from many periods ago is still
20 persistent today.

21 Q. And the Berndt study you're
22 citing predated this Datta and Dave study; is
23 that right?

24 A. I believe it did, yes. It's an
25 earlier study.

1 (Whereupon, Deposition Exhibit
2 Rosenthal-9, 2004 Mizik and Jacobson
3 Publication, was marked for
4 identification.)

5 BY MR. ROTH:

6 Q. Okay. And now I'm going to
7 show you Exhibit 9, which is the Mizik and
8 Jacobson study, Are Physicians "Easy Marks"?
9 Quantifying the Effects of Detailing and
10 Sampling on New Prescriptions.

11 Do you have Exhibit 9 in front
12 of you?

13 A. I do.

14 Q. And this is another document
15 you relied on and quoted in your report.

16 A. Yes.

17 Q. And if you look at page 1710,
18 under the chart, do you see there's a heading
19 Detailing?

20 A. Under -- in Table 2?

21 Q. Yes. There's a Detailing
22 heading on the column underneath Table 2.

23 A. I'm sorry.

24 Q. Sorry, I'm below Table 2. Left
25 side.

1 A. Oh, yes. In the text.

2 Q. In the text.

3 A. I'm sorry, I was looking in the
4 table for a column heading. Yes. Yes. I'm
5 sorry.

6 Q. Okay. So in the column heading
7 in the text, it says Detailing, and then it
8 says: For each of the three drugs in the
9 study, we observed statistically significant
10 positive albeit modest effects of detailing
11 on prescriptions.

12 Do you see that?

13 A. Yes.

14 Q. And then it says: Both current
15 term and carryover effects exist. For
16 drug A, statistically significant positive
17 effects are present contemporaneously and for
18 the subsequent four months.

19 Do you see that?

20 A. Yes.

21 Q. And then if you jump to the
22 next column, the bottom paragraph says: The
23 estimated response to a change in PSR visits
24 for drug B is similar to drug A in that we
25 observe a statistically significant response

1 the month of the visit that diminishes over
2 the subsequent six months.

3 Do you see that?

4 A. Yes.

5 Q. And then you referred already
6 to the Berndt study, which I believe you have
7 there.

8 A. Yes.

9 Q. If we look at that at
10 page 104 -- it's Exhibit 8 -- I thought you
11 said the depreciation rate was zero, but
12 looking at page 104 on the second column, it
13 actually looks like it's 0.03.

14 A. It may be there's another
15 Berndt paper that I believe that I cite. I
16 know there's a zero depreciation rate in one
17 of them. That may be -- if we look at my
18 literature summary, it may be clearer.

19 Q. Okay. We can do that on the
20 next break, but for now let me just mark
21 Exhibit 10.

22 A. Okay.

23 (Whereupon, Deposition Exhibit
24 Rosenthal-10, 2001 G?n?l et al
25 Publication, was marked for

1 identification.)

2 BY MR. ROTH:

3 Q. Which is the G?n?l study,
4 Promotion of Prescription Drugs and Its
5 Impact on Physicians' Choice and Behavior.

6 A. I'm sorry, were you going to
7 ask me a question about this study?

8 MR. SOBOL: Which one?

9 BY MR. ROTH:

10 Q. I think I did. I was just
11 asking what the depreciation rate was and you
12 said --

13 A. I'd just like to remind you,
14 when we talk about these marketing studies,
15 and Mizik and Jacobson is similar to the
16 Datta and Dave one, it's a short period of
17 time for a few select drugs. It doesn't have
18 the ability to look over the long term the
19 way we do.

20 Q. No, I understand.

21 And for those drugs, the
22 depreciation happened within months. In your
23 model, the appreciation happens forever.

24 A. Yes.

25 Q. So if we look at Exhibit 10,

1 the G?n?l study, if you look at page 85,
2 there's a paragraph, Cumulative Discounted
3 Sums of Detailing and Samples.

4 Do you see that?

5 A. You're on 85?

6 Q. 85.

7 A. Yes.

8 Q. And in that paragraph it says:
9 For each prescription physicians write, they
10 are likely to be influenced by past personal
11 selling efforts. We discount the cumulative
12 personal selling effort consistently with the
13 methods used in the advertising literature.
14 The major premise of these methods is that
15 physicians are influenced by the recent
16 visits of sales representatives more than by
17 the distant ones.

18 Do you see that?

19 A. I do.

20 Q. And it looks like in this
21 study -- well, maybe you can help me find it.
22 I don't know if it's on this page.

23 A. They don't -- they don't
24 estimate a depreciation rate. It says they
25 set one.

1 Q. Got it.

2 A. I think it must be in the
3 footnote. Yes.

4 Q. Yeah. I don't see the exact
5 number. But in any event, they depreciated
6 their stock somehow, and if we took the time
7 to review this, we could probably find the
8 exact number.

9 So switching gears for a
10 second. So you said you're not aware of any
11 article. Have you ever done any work in your
12 litigation consulting or expert practice
13 where you've modeled a negative depreciation
14 rate before this case?

15 MR. SOBOL: Objection, asked
16 and answered.

17 A. I would return to the fact that
18 this matter concerns a class of drugs that is
19 different from any other class of drugs for
20 which I have looked at marketing, and I
21 believe that the negative depreciation rate
22 is entirely consistent with that underlying
23 phenomenon.

24 I have not worked on opiate
25 addiction in the past. I have not worked on

1 a marketing study for an addictive product.

2 BY MR. ROTH:

3 Q. Okay. And as you sit here now,
4 you're not aware of any peer-reviewed
5 publication or study that suggests that a
6 negative depreciation rate is ever
7 appropriate?

8 MR. SOBOL: Objection, asked
9 and answered.

10 A. It's my belief that a negative
11 depreciation rate is entirely theoretically
12 consistent with this product. I cannot cite
13 a paper that has estimated one, but I do not
14 find it surprising.

15 BY MR. ROTH:

16 Q. Okay. Let's look at
17 paragraph 55 of your report and Figure 4
18 below that. Are you there?

19 A. I'm sorry, you're at
20 paragraph 55 -- I'm sorry, I went to the next
21 page.

22 Q. Yeah, and it spills -- sorry,
23 it spills to the next page, which is
24 Figure 4.

25 A. Yes.

1 Q. Are you there?

2 A. Uh-huh.

3 Q. And in this chart it looks like
4 you actually model your depreciation rate in
5 red against what your model would look like
6 with no depreciation rate or even a small
7 positive depreciation rate.

8 A. I show you what that would look
9 like, yes.

10 Q. So with even a very slight
11 positive depreciation rate, the line looks
12 almost flat.

13 A. You mean the .01?

14 Q. Correct.

15 A. Yes.

16 Q. And if you hold the
17 depreciation rate at zero, it's got a small
18 increase, but not anywhere close to what you
19 show with your negative depreciation rate?

20 MR. SOBOL: Objection.

21 A. But as you've described the
22 lines, the line that represents the
23 depreciation rate I estimated grows more
24 rapidly, as would be expected because of
25 compounding.

1 Just to be clear, the fact that
2 the stock of promotion grows in this pattern,
3 that is a question of fitting the model
4 appropriately. It's not driving my results
5 in that same relationship.

6 BY MR. ROTH:

7 Q. I'm not sure I understood your
8 last answer. What do you mean it's not
9 driving your results?

10 A. Well, the results aren't
11 inflated in the same way that the stock of
12 promotion is inflated. The estimate in my
13 model, again, where I have promotional
14 effectiveness coefficients, they're now
15 responding -- they'll be lower than otherwise
16 because the average level of promotion is
17 higher, and so it effectively makes promotion
18 look less effective on an incremental basis.

19 And this is really a question
20 of just getting the best fit in terms of the
21 timing.

22 Q. Okay. The blue line on this
23 line graph you describe as the flow of the
24 data. Can you explain what that means?

25 A. Sure. Those are the monthly

1 levels of contacts.

2 Q. So with no adjustment for a
3 stock, this is just the ebb and flow of where
4 the IQVIA data shows promotion is?

5 A. Yes, it's the unadjusted IQVIA
6 total detailing contacts.

7 Q. So it spikes up and down over
8 the course of the entire period?

9 A. It does have the pattern that
10 you see there.

11 Q. Okay. Have you run your models
12 with positive depreciation rates other than
13 the 0.01 you depict on Figure 4?

14 MR. SOBOL: Objection.

15 A. That's not running the model.
16 That's just showing you what the stock would
17 look like.

18 BY MR. ROTH:

19 Q. Okay. So have you even run the
20 model with the stock at 0.01?

21 A. I have not.

22 Q. Okay. So you don't know what
23 that would look like, and you don't know what
24 it would look like if we used a higher
25 depreciation rate?

1 MR. SOBOL: Objection.

2 A. I don't.

3 BY MR. ROTH:

4 Q. And I think you said this, but
5 your model selects the depreciation rate that
6 produces the best fit?

7 A. Yes, that's correct. It uses a
8 Wald test.

9 Q. Okay. We'll come back to the
10 Wald test. But let's look at Figure 2,
11 which, I believe, is a few pages earlier.

12 A. Page 36?

13 Q. You got it. So Figure 2 is a
14 line graph of the MMEs over time.

15 A. That's correct, and it also
16 includes extended units in blue.

17 Q. And what does that mean,
18 "extended units"?

19 A. Extended units are pills.

20 Q. Okay. So you've got both the
21 pills and the MMEs on this graph?

22 A. Yes, and you can see they track
23 almost perfectly.

24 Q. And you can tell, I think, the
25 first thing I see when I look at this graph

1 is a pretty stark decline that starts in
2 2010.

3 Do you see that?

4 A. It does have a clear peak, both
5 of those trends.

6 Q. And do you have any
7 understanding as to why MMEs began to drop
8 off starting in 2010?

9 A. Well, I think I write about
10 that pretty extensively in my report.

11 Q. In paragraph 46 -- yeah, let's
12 look at paragraph 46.

13 A. Maybe not 46. Maybe 56?

14 Q. Oh, you know what, that's
15 Gruber 46. We'll get to him next.

16 A. I'm sorry. Okay.

17 Q. Sorry, which paragraph were you
18 taking me to?

19 A. I am looking for where I
20 discuss the peak.

21 Q. All of your reports magically
22 have the same font and type space, so it's
23 hard to differentiate.

24 A. I think it's later when I talk
25 about --

1 Q. 67 --

2 A. -- estimating the breaks.

3 Q. 67.

4 A. Yeah?

5 Q. Yeah. I think I found it.

6 A. Yes.

7 Q. Okay.

8 A. So that's sort of the -- that's
9 where I talk about the first break.

10 Q. Yeah. So you say: The
11 accelerated growth in opioid prescribing that
12 followed the guideline and messaging changes
13 continued for approximately a decade before
14 it was finally arrested and ultimately
15 reversed by the cumulative effects of
16 physician leadership, media attention, public
17 health surveillance and regulation.

18 Do you see that?

19 A. I do.

20 Q. And you agree that all of those
21 efforts, doctors, media and public health,
22 did not just simultaneously happen in
23 August 2010?

24 A. They did not, which is why I
25 don't assume that.

1 Q. And when you refer to
2 regulation in that paragraph, what
3 specifically are you talking about?

4 A. Well, so, for example, certain
5 states required that physicians use a
6 database to look at prescribing for the
7 patient before they could write a
8 prescription, so prescription drug monitoring
9 programs and educational requirements around
10 those prescription drug monitoring programs.

11 In some places there are --
12 like Massachusetts, for example, there have
13 also been prescribing limits that were
14 passed. So those kinds of things.

15 Q. And then did you review
16 Professor Gruber's report?

17 A. I did.

18 Q. Before yours was finalized or
19 at some point after?

20 A. Perhaps before.

21 Q. Okay. So I'll -- I could mark
22 it, but I'm just going to read to you from
23 it. And if you want me to mark it, I will.

24 But he says in paragraph 46:
25 Beginning around 2010, increased enforcement

1 actions by DEA and DOJ, criminal actions and
2 litigation, the growth of state PDMP laws and
3 increased awareness of addiction risks
4 associated with prescription opioids
5 contributed to a reduction in aggregate
6 shipments of prescription opioids after more
7 than 20 years of rapid growth.

8 Are you aware of that passage
9 in his report?

10 A. Yes, and I think that there's
11 absolutely nothing inconsistent with what he
12 says. He uses a couple of different
13 examples, but we're in agreement that it's
14 multifactorial and gradual.

15 Q. Agree. And you both mention
16 PDMP laws, and I think he's got a couple of
17 other examples about the DEA and DOJ.

18 But that was what I was going
19 to ask you is, are you in agreement with him
20 that these multifactorial events contributed
21 to the decline in 2010?

22 A. That is the environment that I
23 capture using that third era in which these
24 events are essentially reducing the
25 effectiveness of promotion.

1 Q. Okay. So let's talk about your
2 eras. So if you go to paragraph 71, you're
3 talking about Model B, and I think you called
4 this in your report your preferred model.

5 A. I do.

6 Q. Okay. And just so we
7 differentiate, we'll get to Model C.

8 Model A, as you describe it in
9 paragraph 70, is assuming the effectiveness
10 of detailing is constant, so meaning, if I
11 look at Table 1, you just used the stock of
12 promotion and the depreciation rate without
13 adjusting for different eras in Model A.

14 A. Yes, that's correct. I mean,
15 they both have a single depreciation rate,
16 but there's a single stock of promotion in
17 Model A, and the price index, of course.

18 Q. And then in Model B, it's those
19 two things plus you've added these two eras
20 in?

21 A. That's correct.

22 Q. And in Model C, it's Model B
23 with the five events mapped onto it?

24 A. That's correct.

25 Q. Okay. So let's start with

1 Model B. 71 says: Model B allows the
2 effectiveness of promotion to change at two
3 points in time, determined using
4 specification tests. Thus, this model
5 captures three different periods or eras of
6 the opioid market: the initial era, an
7 increase in MME sales during the second era,
8 and a third era marking the gradual decline
9 of MME sales.

10 Do you see that?

11 A. Yes.

12 Q. What do you mean, "determined
13 using specification tests"?

14 A. Well, we essentially -- we do
15 much the same as what Professor Cutler does
16 in his report, which is basically conduct an
17 F-test, which is looking at the fit of
18 alternative models, and we have these -- we
19 have two time points, so we're looking at a
20 two-dimensional space and looking to see
21 which model fits the data best by, again,
22 iterating over -- I think it says in --

23 Q. Yeah, let's look at Attachment
24 D5. I'll help you out.

25 A. That's right, iterating over, I

1 don't know, 1600 models, something like that.

2 Q. You get how this goes. I get
3 your memory first, and then we can look at
4 the report.

5 A. Yes. I know I should just tell
6 you that I don't remember.

7 Q. That's okay. All right. D5,
8 Determining Turning Points in Effectiveness
9 of Promotion.

10 A. Okay.

11 Q. Tell me when you're there.

12 A. D5. Okay. Yes.

13 Q. So it says: In Model B, the
14 two dates that would delineate the early and
15 late change in the effectiveness of
16 promotional stock were determined through a
17 two-dimension search. The first turning
18 point was chosen between January 1999 and
19 January 2003, and the second turning point
20 was chosen with the date between January 2010
21 to December 2011.

22 Do you see that?

23 A. Yes.

24 Q. So let me stop there.

25 So when you say "it was

1 determined between," were you just conducting
2 the searches within those date ranges?

3 A. Yes, that's right.

4 Q. So you didn't just search the
5 whole model for the breaks; you limited the
6 dimensions you were looking for?

7 A. Well, as you can see, there
8 were 1,176 combinations already, so there's a
9 bit of a scale issue in looking at every
10 combination.

11 And also, the way the tests
12 work out, it seemed fairly clear that we
13 weren't getting better and better fit by
14 going out further, that the solutions were
15 closer to the middle, and so that's why we
16 didn't feel like we needed to go outside of
17 those ranges.

18 Q. How long did it take the
19 computer to run 1,176 combinations?

20 A. Fortunately, I did not have to
21 run those myself. Probably not that long.

22 Q. I feel bad for Greylock.

23 And so you ultimately chose
24 these two breaks based on the maximum Wald
25 statistic produced from running the model

1 almost 11 -- 1,176 times?

2 A. That's correct.

3 Q. And what is a Wald statistic?

4 A. It's -- like I said, it's like
5 an F-test that's looking at the joint
6 significance. We talk about an F-test
7 elsewhere in this model, looking at the joint
8 significance -- actually, in my errata you
9 see I talk about the F-test, doing
10 significance of a set of variables and seeing
11 the formulation in which those variables
12 explain -- effectively explain the model
13 best.

14 Q. And is it a common practice in
15 econometrics to choose a model based on
16 maximum fit?

17 A. It's one of the considerations
18 that one does in a model. And here we're
19 talking about a set of parameters that we're
20 trying to optimize with regard to
21 depreciation. It's not the only thing that
22 we use to select the model.

23 As you know, I also report the
24 adjusted R-squared, and that was part of my
25 decision-making across models. And there are

1 other factors.

2 Q. Okay. If we turn back to the
3 body of the report, paragraph 57 introduces
4 Figure 5.

5 Do you see that?

6 A. Uh-huh.

7 Q. So you say: Figure 5 -- which
8 is on the next page -- is a timeline of key
9 events. According to plaintiffs' experts and
10 the published literature, the perceptions of
11 physicians and the public evolved as a direct
12 result of the alleged misconduct.

13 Do you see that?

14 A. Yes.

15 Q. You cite Dr. Perri.

16 A. Yes.

17 Q. And then you say: These
18 changes, which were the result of the
19 defendants' actions, would have affected the
20 receptiveness of prescribers and patients to
21 promotional messages about the safety and
22 effectiveness of opioids.

23 Do you see that?

24 A. Yes.

25 Q. And then you describe how the

1 key events identified by plaintiffs that
2 helped promote expanded prescribing are in
3 green and the subsequent public health and
4 regulatory events that signaled the growing
5 realization about the dangers are in red.

6 A. Yes.

7 Q. All right. So let's look at
8 Figure 5 on page 41, and we're going to do
9 our best job to articulate on the deposition
10 transcript the picture that we're looking at.

11 So it looks to me like Figure 5
12 is --

13 MR. SOBOL: Why don't you show
14 it to the camera for a second.

15 Seriously. Just get a shot of that.

16 MR. ROTH: It's a work of art.

17 THE WITNESS: It is a work of
18 art.

19 MR. SOBOL: Christmas.

20 BY MR. ROTH:

21 Q. So if you look at Figure 5,
22 you've got the MME trend graph that we looked
23 at in Figure 4 with a timeline and the events
24 described in the paragraph above it, right?

25 A. That's correct.

1 Q. And so we'll talk about the
2 five you picked to test in Model C, but did
3 you think about using any of the events on
4 this timeline to choose where you do your
5 testing for the breaks?

6 A. I considered and rejected that
7 idea for reasons I think I do describe in my
8 report. And I'm happy to explain further.

9 Q. Yeah, if you don't mind.

10 A. So as you can see from the
11 timeline, there are a number of discrete
12 events. They're marked on the timeline at
13 the time they were either announced or passed
14 or in some way published, and still, they are
15 clearly events that could have had both
16 anticipation effects and sort of long
17 adoption curves.

18 And so just the notion that
19 these -- any one of these points would have
20 determined a break in the promotional
21 effectiveness, it seems like it was not quite
22 the right model. Although, again, I included
23 them in Model C to explore this further.

24 It's my opinion that these
25 should be treated more cumulatively and that

1 is why I used the multi-era model, and I
2 think that's entirely consistent with the way
3 Dr. Perri describes the events, particularly
4 the green ones, the ones that were
5 influencing the adoption of opioids.

6 Q. Just so I understand it, your
7 break based on the Wald statistic is sometime
8 in early 2002; is that right?

9 A. It's probably not a good idea
10 ever for me to trust my memory, so I'm going
11 to go and look at that.

12 Q. Yeah. It's in the report.

13 A. Yes, it is, it's absolutely in
14 the report.

15 Q. And it may be in the errata,
16 because I saw some of the dates changed a
17 little bit last night.

18 A. Paragraph 71.

19 Q. Paragraph 71, yeah.

20 A. Right. So March 2002 is the
21 first break.

22 Q. In the report it says
23 April 2002. That was one of the errata?

24 A. Yes. I think someone was
25 reading the first month versus the last

1 month, the first of the old era versus the
2 last of the -- first of the new era.

3 Q. So it changes as of April 1st?

4 A. It changes as of March 1st. I
5 mean, the data are monthly, so -- not daily,
6 so it changes as of March.

7 Q. Okay.

8 A. And then the second turning
9 point changes as of August.

10 Q. So if we were to plot
11 March 2002 on Figure 5, it would be after the
12 first five events in green but before the
13 last two events in green?

14 A. That -- I can affirm that.

15 Q. And then if we were to plot the
16 August 2010 break on the curve in Figure 5,
17 it would be -- it looks like after maybe
18 three or four of the red events but before
19 the other six or seven.

20 A. I -- that may be true. I think
21 it's a lot harder to say. That's just a
22 dense part of the chart, and I wouldn't trust
23 my eyeballs on it.

24 Q. Okay. But again, as we
25 discussed, those breaks are not correlated

1 with these events; they're the function of
2 searching using the Wald statistic for where
3 the curve breaks?

4 A. Yes. And again, to be clear,
5 they're telling us where the relationship
6 between the stock of detailing and sales
7 seems to change in a statistically
8 significant way. And they're entirely
9 consistent with some kind of S-curve at the
10 beginning, when we think about a standard
11 diffusion curve, that there -- there is sort
12 of a point at which diffusion accelerates,
13 and that is what we're estimating on the
14 first one.

15 And the second turning point I
16 guess would be a reverse diffusion curve. I
17 think de-innovation is a word, and not one
18 that I use a lot, but that seems to be what's
19 happening. And again, it's not like you've
20 turned on a light switch and everyone
21 changes, but cumulatively over time, that's
22 putting the brakes on.

23 Q. Okay. But your model, the way
24 you account for that is you do actually turn
25 on the light switch and change the stock of

1 promotion as of those dates?

2 A. I -- no. That's not -- that's
3 not true. So what I do is I allow for the
4 promotional effectiveness to change in the --
5 in the first instance as a level shift and in
6 the second instance as a trend shift.

7 Q. And so we'll talk about each of
8 those, but in paragraph 68 you talk about how
9 this led you to adopt a piecewise model.
10 What is a piecewise model?

11 A. Well, it's essentially where I
12 assume there's a linear relationship between
13 the stock of promotion and sales that differs
14 over these different eras.

15 Q. And when is it appropriate to
16 use a piecewise model in econometrics?

17 A. Well, in this case, this is an
18 aggregate time series model, and we believe
19 that the fundamentals of that relationship
20 are changed by something in the environment.

21 Q. So in addition to your
22 appreciating depreciation rate, we now have
23 adjustments in these two eras to fit the MME
24 curve.

25 MR. SOBOL: Objection to form.

1 A. Just to be clear, it's about
2 fitting -- the R-squared is about fitting the
3 MME curve, but really, the test that we're
4 doing is about understanding the relationship
5 between detailing and sales and fitting that.

6 BY MR. ROTH:

7 Q. I understand that, but you're
8 making modifications to the detailing stock
9 that is allowing it to fit better with the
10 MME curve?

11 A. Well, the detailing stock
12 and -- you're talking about the depreciation
13 rate. That is being determined, again, based
14 on the fit of the overall statistical model.
15 It's not just trying to make it fit the shape
16 of the MMEs, which I think is what you said.

17 Q. Right. But when you make the
18 depreciation rate change to the stock of
19 promotion and then you allow the model to
20 tell you where the effectiveness of promotion
21 also changes, are you not then essentially
22 fitting the detailing curve to the MME curve?

23 A. I do not believe so, no.
24 That's not what I'm doing. What I'm trying
25 to do is establish a relationship that best

1 fits the data. Over time, that relationship
2 could be that promotion has very little
3 effect on sales. And so the quantum of the
4 impact here is not what I'm fitting the data
5 to.

6 Q. Okay. As you describe it in
7 your report, the coefficients on the stock of
8 detailing are estimated separately during
9 each of the three eras; is that correct?

10 A. Well, in effect, we can look at
11 the results, so maybe it will be a little
12 clearer than my hand-waving without having it
13 in front of me.

14 Q. Table 1, is that what you
15 wanted or do you want --

16 A. Yes, Table 1, that's right. So
17 we have the stock of promotion through --

18 MR. SOBOL: I'm sorry, page?

19 THE WITNESS: Oh, sorry.

20 Page 47. Sorry.

21 A. We have the stock of promotion
22 that is the continuous series that we saw
23 plotted in that other figure, and then in
24 Model C, I interact that with the dummy
25 variable for the first era.

1 And then I also -- I interact
2 that separately with the variable from
3 March 2002. So those two are essentially
4 separate estimates over those two time
5 periods, but in -- in the third period,
6 because we're looking at an erosion curve,
7 that's just literally what's happening here
8 is opioid prescribing is eroding. I enter
9 the interaction with that era as a trend, so
10 then that's the sum of the stock of promotion
11 from 2002 and the dummy trend.

12 BY MR. ROTH:

13 Q. All right. So you're jumping
14 ahead of me. I'm going to ask you about the
15 dummy trend.

16 A. Okay.

17 Q. But the stock in period 3 is
18 actually overlapping with the stock in period
19 2; is that right?

20 A. Yes, the stock of promotion --
21 again, because the third period basically is
22 adding on to the second period, they're being
23 estimated -- I mean, the model of course is
24 estimating over the entire period, but the
25 variables are separated such that we have one

1 variable that's the stock of promotion times
2 a dummy variable, so it becomes zero at March
3 of 2002. That's beta-1.

4 And then beta-2 goes a variable
5 that's zero before 2000- -- that break
6 date -- now I can't remember if March is
7 the -- oh, yeah, it is March of 2002, so
8 Table 1 was always right -- up to 2002, and
9 then it becomes whatever the stock of
10 promotion is, right?

11 And so beta-3 has that same
12 stock of promotion and it has this multiplier
13 effect for the trend.

14 Q. So what I'm trying to
15 understand is before you put in your trend
16 into period 3, if we recognize that there's a
17 period, according to you, of rapid growth
18 after efforts to market --

19 A. Yes.

20 Q. -- followed by a period of
21 decline after growing realization about the
22 dangers, why are those starting from the same
23 baseline and adding a trend as opposed to
24 having some other variable applied to the
25 stock in Era 3?

1 A. Yeah, let me try to explain
2 that. And just to be clear, I know you know
3 this, but let me just remind you that the
4 turning point in the MME trend is not the
5 turning point that marks off Era 3, right?

6 Q. Right.

7 A. That starts earlier.

8 One thing one could have done
9 is just say, okay, we're going to split the
10 model at that turning point, and so that is
11 the light switch notion, rather than looking
12 to see where the relationship seems to
13 change.

14 And we know the relationship is
15 such that it's -- we know conceptually, based
16 on the other evidence, that -- and just from
17 reading the news, that public health
18 authorities are trying to limit opioid
19 prescriptions and they're having some
20 success, and so that we know that we need to
21 put in a trend that will capture when that
22 happens.

23 There's no way to have
24 something that is an increasing trend go
25 south without giving it the opportunity to

1 have a second coefficient. And by using a
2 trend and allowing the break to happen
3 whenever it happens, I can actually allow the
4 data to tell me at what pace that erosion
5 happened.

6 Otherwise, I would have to sort
7 of, again, plug it at the top and just
8 measure the relationship on that second bar.
9 So this was the most flexible way to use the
10 data to look at what's happening to promotion
11 over time. It's entirely flexible. If, in
12 fact, you know, promotion kept going up and
13 it was just not explaining that trend, then
14 the model would have told me that.

15 Q. Okay. So now I want to get to
16 the dummy trend.

17 A. Yeah.

18 Q. So what support do you have for
19 using the dummy trend only in Era 3 as
20 opposed to before?

21 A. Yeah, for sure. So again,
22 because in Era 2 what we're looking at was a
23 growing acceptance of the idea that opioids
24 were safe, that we could have used a trend
25 there.

1 A linear shift is the simplest
2 way of capturing that, and essentially, what
3 will happen is then in that case, by using a
4 shift rather than a trend, what we'll get is
5 an average effect as opposed to one that --
6 where we can plot out the changes over time,
7 if there were changes over time, but it would
8 capture that increase either way.

9 When we're looking at the
10 erosion side, however, just picking --
11 putting an additive effect in like the first
12 trend, would require that we fix that really
13 to the peak of the model in order to make any
14 sense of -- of the way the trend reverses,
15 and yet again, we don't -- we don't change
16 the underlying stock of promotion. That is
17 what it is.

18 If, in fact, that relationship
19 can't be explained by the stock of promotion,
20 then we would -- we would not get a
21 significant coefficient on that.

22 Q. When you implement the dummy
23 trend incremented by month in the third era,
24 that means the effect of the third period
25 stock is increasing over time still, right?

1 A. Well, the effect of the stock
2 is what it is with the negative depreciation
3 rate. So the effect -- the stock continues
4 to increase, as we discussed earlier, and
5 nonetheless, the productivity of a given unit
6 is decreasing. So relative to the previous
7 period, the average productivity of a unit of
8 the stock of promotion is lower.

9 Q. Did you try to run the model
10 using a dummy incremented by months in the
11 first two eras?

12 A. I don't believe so. Again, the
13 simplest -- the simplest way to think about
14 that was a slope change, and that's what we
15 did there. It was really only when we came
16 to trying to figure out how best to let the
17 data tell us about this turning point that a
18 trend seemed like the best approach.

19 Q. If the effectiveness of
20 promotion is changing in each of the eras,
21 why did you keep the depreciation rate
22 constant the whole time?

23 A. We used a single depreciation
24 rate because we think that it is something
25 more structural. As I've talked about, the

1 depreciation rate in my mind reflects the
2 particular context here with an addictive
3 good, so there's no reason for that to change
4 over time.

5 I separate the assumption I
6 make about the depreciation rate, which
7 again, is empirically based, from the
8 assumption about promotional effectiveness,
9 which has something to do again with these
10 environmental factors. So there are two
11 different things.

12 Q. I guess where I'm missing you
13 is I get that the effectiveness of promotion
14 changes, right?

15 A. Uh-huh.

16 Q. As I understand the
17 depreciation rate, that's measuring how
18 lasting the promotion is into the future, and
19 so what I'm missing is if the effectiveness
20 of promotion as a whole is changing, why
21 isn't the effectiveness of a detail into the
22 future also changing at the same time?

23 A. Again, I believe that what
24 drives the negative depreciation rate over
25 the whole period is the addictive nature of

1 the good, and so, you know, you're using
2 words that are very useful to describe the
3 phenomenon, but they're not a complete
4 explanation because of the fact that we have
5 this addictive good.

6 Even as physicians may have
7 been writing fewer new prescriptions, it is
8 still true that patients who are already on
9 opioids are likely to be refilling those
10 drugs with some likelihood, and so it may
11 well be that we're capturing a lower
12 incremental effectiveness, but still we have
13 the long-lasting effects of the previous
14 patients who were on these drugs.

15 Q. But if regulations are changing
16 and PDMPs are coming into place and medical
17 standards are changing, all of which are
18 driving prescriptions and MMEs lower, why
19 does that not affect at all the lasting
20 effectiveness of detailing in your model?

21 A. It does affect sales by
22 reducing the incremental effectiveness of
23 promotion. That is the way that it affects
24 it.

25 There's no reason particularly

1 that it should be captured through the
2 depreciation rate. The depreciation rate,
3 again, I estimate as a single variable over
4 time, I think that's appropriate because it
5 captures the underlying nature of this
6 marketplace.

7 Q. Did you run the model
8 estimating different depreciation rates
9 during each of the three eras?

10 A. During -- no. During each of
11 the three eras, no, I did not.

12 Q. Did you consider modeling more
13 than three periods?

14 A. I did not. As we've talked
15 about, while I allow the data to tell me the
16 turning points, I have a conceptual idea
17 about why these two general points in time
18 are important; that one is sort of the
19 acceleration of opioid prescribing, and the
20 other is the reversal.

21 Q. Did you consider modeling two
22 or one period instead of having -- well, one
23 I guess we talked about. You did that.

24 So -- but did you consider
25 modeling just two periods?

1 A. It's very clear that there is
2 at least this important change at the end.
3 It's -- it is possible that -- that the
4 effect of the first period to the second
5 period is small enough that we could have
6 just used the one change, but nonetheless,
7 it's statistically significant, that effect.

8 Q. And then if you look back at
9 paragraph 70, you say for Model A, which is
10 the one that doesn't have these eras or the
11 events, which we'll get to -- for Model A on
12 page 48, it does not capture well either the
13 initial growth in opioid sales or the change
14 that occurred in 2011.

15 In short, estimating Model A
16 teaches us that there's likely a changing,
17 not constant, relationship between detailing
18 and sales over this long 1993 to 2018 time
19 period that should be explored to more
20 accurately describe the relationship.

21 Do you see that?

22 A. Yes.

23 Q. And the way you explored it
24 was, as we talked about, by running the model
25 1100-plus times and calculating the Wald

1 statistic?

2 A. That's correct.

3 MR. ROTH: I'm ready to move to
4 Model C, but how are you doing? Do
5 you want a quick break?

6 THE WITNESS: Maybe a quick
7 one. That would be great, thanks.

8 THE VIDEOGRAPHER: The time is
9 2:12 p.m., we are now off the record.

10 (Recess taken, 2:12 p.m. to
11 2:27 p.m.)

12 THE VIDEOGRAPHER: The time is
13 2:27 p.m. We're back on the record.

14 BY MR. ROTH:

15 Q. Professor Rosenthal, have you
16 studied the addictiveness of opioids?

17 A. Personally, no. Again, I have
18 reviewed various articles and reports on
19 this, but I'm not a clinical expert.

20 Q. What articles and reports are
21 you thinking of?

22 THE WITNESS: I'm getting sound
23 from the phone.

24 A. Well, there are some articles
25 that I believe I cite in my report, but a

1 number of articles, particularly in the
2 economics literature, that talk about
3 addiction and death and its connection to
4 other economic phenomena, and they, of
5 course, cite a fair amount of public health
6 information.

7 I have read information from
8 the CDC website about the opioid epidemic and
9 the addictive nature of these products in the
10 CDC guidelines.

11 BY MR. ROTH:

12 Q. Beyond the CDC information and
13 the economic literature cited in your report,
14 are there any other sources you've reviewed
15 for information about the addictiveness of
16 opioids?

17 A. There are a number of other
18 guidelines that I cite, one from the American
19 Academy of Emergency Medicine. I'm happy to
20 look in my report, but there are a number
21 that I cite in the introduction, but more so
22 in Section X.

23 Q. We'll get there.

24 Before we do, have you reviewed
25 any study of the rate of addiction for

1 specific opioid drugs?

2 A. No, I have not.

3 Q. Have you reviewed any study on
4 the rate of the need to increase prescription
5 for any individual opioid drug?

6 A. Can you explain a little bit
7 more what you mean by that?

8 Q. Yeah. Sorry. Sorry.

9 Have you reviewed any study on
10 increasing the dosage for a patient on opioid
11 drugs specific to any opioid drugs?

12 A. Like I can't recall any
13 specifically right now. I -- there's a paper
14 that I cite in Section X that pertains to the
15 treatment of cancer patients, for example,
16 and it talks about dosing. It may talk about
17 specific drugs, but I can't say for sure.

18 Q. Are you aware of the phenomenon
19 that certain patients may have their dosage
20 of opioids increased because they become
21 tolerant at the lower dose?

22 A. Yes, I believe I described that
23 phenomenon as well, and the allegations that
24 the conversation around increasing dosages
25 was some of what was manipulated by the

1 defendants.

2 Q. Do you know what the rate of
3 opioid addiction is in either Summit or
4 Cuyahoga County?

5 A. As I sit here, no.

6 Q. Okay. I'd like to look at
7 Appendix D, page D5. So we talked about the
8 first paragraph on the Wald statistic. In
9 the second paragraph, you say: Separate from
10 marketing efforts, there are other factors
11 that could potentially influence the sales of
12 opioids.

13 Do you see that?

14 A. Yes.

15 Q. And I think we talked about
16 some of those factors this morning.

17 A. We did.

18 Q. And you say: While marketing
19 to physicians is one important explanation
20 for changes in sales, and the use of dummy
21 variables captures broad factors that
22 influence the market for opioids, there could
23 still be factors that influence physicians to
24 write prescriptions and consumers in their
25 willingness to fill prescriptions for

1 opioids.

2 Do you see that?

3 A. Yes.

4 Q. And so you list five events
5 that you included in Model C to test as
6 turning points.

7 A. Yes.

8 Q. And you say --

9 A. Oh, sorry. Just to be clear.
10 You said turning points and I agreed, but
11 these are not exactly turning points. They
12 would be shifts.

13 Q. Events.

14 A. Yes.

15 Q. That's a good clarification.
16 You've got two turning points and five
17 events.

18 A. Right.

19 Q. Okay. And I want to look back
20 at Table 1 in a minute, but before we do
21 that, you say underneath this: My a priori
22 expectation is that the first three events --
23 meaning the consensus statement, the
24 Federation of State Medical Board Guidelines
25 and the JCAHO pain standards -- would have a

1 positive impact on the quantity of MMEs
2 prescribed per month.

3 Do you see that?

4 A. Yes.

5 Q. And then you say: The
6 reformulation of OxyContin could have an
7 ambiguous impact on MME sales.

8 Do you see that?

9 A. I do.

10 Q. Okay. So why did you select
11 just these five events as opposed to others
12 we saw depicted on Figure 5 in your report?

13 A. I selected events. I was
14 looking to pick some from the early period
15 and some from the later period, and
16 particularly from -- well, in both periods,
17 around the time that we see acceleration or
18 deceleration in MMEs. So they were selected
19 really based on timing.

20 Q. Did you model any of the other
21 events listed in Figure 5?

22 A. I did not.

23 Q. Are there other milestones not
24 depicted in Figure 5 you could test as events
25 in your model?

1 A. I included in Figure 5 the
2 major milestones that I was aware of, so I
3 don't know that there are others that are not
4 there.

5 Q. Did you try to model the five
6 events you used in Model C against the
7 Model A curve to see what that would look
8 like?

9 A. No, I did not. The decision to
10 do the turning points really relates to the
11 estimated relationship between promotion and
12 sales, and so that was the foundational
13 model.

14 Q. Okay. So let's turn to
15 Table 1, which is on page 47.

16 A. 47, you said?

17 Q. Yeah, page 47.

18 A. Okay. All right.

19 Q. And Table 1 is the output of
20 your model, the three different models that
21 you ran, correct?

22 A. That's correct.

23 Q. Okay. So -- and actually, you
24 also can see in Table 1 some of the input
25 variables at the top?

1 A. I'm sorry. What do you mean by
2 that?

3 Q. Sorry. The output -- well, I
4 guess, describe what the constant and stock
5 of promotion, those are the explanatory --
6 the constant is a constant, but the stock of
7 promotion, those are the explanatory
8 variables in your model, correct?

9 A. That's correct. Everything on
10 the left-hand side is effectively an
11 explanatory variable.

12 Q. Okay. I guess first, why is
13 the constant for Model A basically twice as
14 high as Model B or Model C?

15 A. Well, it's capturing sort of
16 the unexplained average in effect, the
17 intercept, and there's more in Model B and
18 Model C to explain the underlying data.

19 Q. Okay. And then Model A
20 actually is the one model where you have a
21 depreciation rate that's essentially zero.
22 It's a small positive depreciation rate.

23 A. They're all small, so -- but
24 yes, it's a small positive.

25 Q. And then B and C both have the

1 negative depreciation rate that we discussed
2 earlier?

3 A. That's correct.

4 Q. So looking at the results from
5 Model C, the consensus statement from AAPM
6 and APS, what do you understand that
7 statement was?

8 A. It's discussed at greater
9 length in Dr. Perri's report, but the
10 American Academy of Pain Management and the
11 American Pain Society had a consensus
12 statement related to the undertreatment of
13 pain and the need for more attention to the
14 treatment of pain and the effective use of
15 opioids for such treatment.

16 (Whereupon, Deposition Exhibit
17 Rosenthal-11, The Use of Opioids for
18 the Treatment of Chronic Pain
19 Consensus Statement, was marked for
20 identification.)

21 BY MR. ROTH:

22 Q. I'm going to mark as Exhibit 11
23 the consensus statement from the American
24 Academy of Pain Medicine and the American
25 Pain Society.

1 Do you have that document?

2 A. I do.

3 Q. And is this the consensus
4 statement you're referring to?

5 A. I believe so. I'm just looking
6 for a date on it. Oh, of '96. So the --
7 what I have is dated 1998 in my model, so I'm
8 not sure this is exactly the same one.

9 Q. Yeah, I was going to ask you
10 about that. I mean, is there another
11 statement from 1998 you recall looking at?

12 A. We should look at my documents
13 relied on.

14 Q. All right. So let's look at
15 Attachment B. And as I see this, under Other
16 Documents, four down on page B3?

17 A. Okay.

18 Q. You list the American Academy
19 of Pain Medicine and the American Pain
20 Society, "The use of opiates for the
21 treatment of chronic pain," and it has got
22 the same title as this document; is that
23 right?

24 A. Yes, it does.

25 Q. And it looks like it was

1 published in the Journal of Pain in 1997; is
2 that right?

3 A. Yes. Yes.

4 Q. And you can see from the
5 document I just handed you that this was
6 actually approved sometime in 1996; is that
7 right?

8 A. That's right.

9 Q. So do you know why this was
10 used or estimated in the model in
11 January '98, if that's the case?

12 A. I'm not sure as I sit here
13 whether there was another -- as when I was
14 describing these events in the first
15 instance, I was saying that there are
16 different dates that pertain to, for example,
17 when they're published in the Journal of
18 Pain, in this case, versus disseminated, so
19 I'm not sure what the 1998 date is as I sit
20 here. I'd have to check.

21 Q. And if we flip back to
22 Figure 5 --

23 A. Because it appears that way in
24 Figure 5, doesn't it?

25 Q. That's what I was just going to

1 ask you.

2 A. Let's have a look. It does.

3 It appears -- oh, no.

4 Q. Well, there's two. It looks
5 like it's actually in '97.

6 A. That does look like it's '97,
7 which would be the date of the -- of the
8 article that I cite.

9 Q. Yeah. So is this something
10 that just didn't get picked up by the errata
11 or was the data actually run in '98 or
12 sitting here, you just don't know?

13 A. Sitting here, I don't know.

14 Q. Okay. Regardless, whenever you
15 ran the model to account for this statement,
16 it estimated negative [REDACTED] MMEs; I
17 assume that's the unit for that, right?

18 A. Yes, that's correct.

19 Q. And we can both agree that that
20 is directionally not what you would have
21 expected based on the theory that this would
22 have inspired more doctors to write
23 prescriptions for opioids?

24 A. Yes, I think I say exactly that
25 in my text, do I not?

1 Q. You do. You say it did not
2 conform to your expectations, I think.

3 A. Yes.

4 Q. Let me find exactly what you
5 say.

6 A. Actually, I need to -- now I
7 need to go back and remind myself.

8 So it's -- that one was not
9 statistically significant, so I don't say
10 anything about it because it's effectively
11 zero. I mean, as, by the way, the positive
12 depreciation rate in Model A is effectively
13 zero. So anything that doesn't have
14 asterisks next to it should be treated as
15 zero.

16 Q. Got it, yeah. So I'm
17 looking --

18 A. I don't interpret it. It's
19 standard practice to not interpret
20 insignificant coefficients.

21 Q. Yeah. So I'm looking at
22 paragraph 73. So you discuss only --

23 A. Yeah.

24 Q. -- the '99 federal, state
25 medical board guidelines and then the

1 hydrocodone rescheduling. You don't discuss
2 the consensus statement form.

3 A. That's right, because it wasn't
4 significant. So what I was recalling is it's
5 the hydrocodone rescheduling that is
6 counterintuitive and significant, yeah.

7 Q. Yeah. Although you did say in
8 Attachment D at D5 that your a priori
9 expectation was that this event would have a
10 positive impact on the quantity of MMEs.

11 A. Did I?

12 Q. You did.

13 A. The two reformulation, then I
14 have an errata to my errata. The two
15 reformulation variables, as you can see in
16 the figure, they come at a time -- regardless
17 of whether the rescheduling itself caused a
18 reduction in MMEs, they come at a time where
19 the steps taken to reschedule hydrocodone are
20 consistent with DEA and others putting the
21 brakes on opioids.

22 So it should have said -- my
23 priors -- because my priors are captured more
24 or less in the color of Figure 5.

25 Q. Okay. I think I inadvertently

1 confused you. To be clear, you say in
2 Attachment D that the consensus statement
3 would have a positive effect. You said
4 actually nothing about what the hydrocodone
5 rescheduling would do -- oh, no, you do. You
6 do. You say: The impact of rescheduling
7 hydrocodone from Class III to Class II could
8 result in a reduction of MME sales.

9 A. Did I -- I'm sorry, I should
10 just catch up and read it.

11 Q. Yeah. Let's go to D5 so we're
12 all on the same page.

13 A. I think I say that some of them
14 are more ambiguous than others.

15 Q. You do say that about
16 OxyContin.

17 A. Uh-huh.

18 Q. And then at the bottom of the
19 penultimate paragraph, you say: The impact
20 of rescheduling hydrocodone from Class III to
21 Class II could result in a reduction of MME
22 sales.

23 A. Right.

24 Q. And then if you go back to
25 Table 1, in fact, it actually increases MME

1 sales.

2 A. Increases them, yes.

3 Q. And it looks like it does so in
4 a statistically significant way because
5 you've got asterisks there.

6 A. That's correct. So that is the
7 one where we can now see what I said about
8 that one.

9 Q. So you said about that one --

10 A. Yes, counterintuitively
11 suggests an increase, yes.

12 Q. And you expected it to have the
13 impact of decreasing MMEs?

14 A. I did.

15 Q. And what does the fact that
16 your model showed it was a statistically
17 significant impact mean for the validity of
18 Model C?

19 A. Well, as you know, I preferred
20 Model B in part because this suggests that
21 there's some problem, at least with
22 interpreting that coefficient, and it's my
23 broader belief that, you know, we can think
24 about the list of events that are in my
25 Figure 5, and others, and there are many

1 discrete events, all of which are picking up
2 on broader phenomena, either a loosening of
3 restrictions around opioids or a tightening
4 of restrictions, and just conceptually,
5 trying to pin any one of them to have begun
6 at a discrete point in time seems
7 problematic; and likely, the reason that I
8 get a counterintuitive result is that there
9 are other correlated -- for example, putting
10 both the OxyContin reformulation and the
11 hydrocodone rescheduling may have caused some
12 interaction between the two.

13 And so that's also why I didn't
14 then just try to keep adding events with the
15 notion that this was not the right modeling
16 approach for what was going on in this
17 market.

18 Q. Okay. And then if you look
19 back at Table 1, you mention the OxyContin
20 reformulation, which does not look like it
21 was statistically significant, but also
22 resulted in estimating [REDACTED] additional
23 MMEs?

24 A. That's correct. It's zero, but
25 positive.

1 Q. Are you aware that Professors
2 Cutler and Gruber opined that the 2010
3 OxyContin reformulation led to an abrupt
4 market shift that thickened the market for
5 illicit heroin?

6 MR. SOBOL: Objection to the
7 form.

8 A. I am aware of their general
9 opinions. I could not have quoted them. But
10 I'm aware that it's more broadly understood
11 that the reformulation of OxyContin caused a
12 number of opioid users to switch to illicit
13 opioids. I believe that's been shown in
14 other literature.

15 BY MR. ROTH:

16 Q. So how do you reconcile your
17 model showing that there's actually no effect
18 on MMEs from the reformulation of OxyContin
19 with their opinion that it led to some
20 massive shift of opioid users to illegal
21 drugs like heroin?

22 MR. SOBOL: Objection.

23 A. Well, a couple of things.
24 First, I believe the model that I put forward
25 in Model B, which captures the environment,

1 the environment I've generally been thinking
2 about in the third era is one in which public
3 health restrictions are tamping down on
4 opioid use.

5 That's already being captured
6 in that dummy trend that we talked about
7 earlier, so some of that is getting picked
8 up, as opposed to being able to pull it out
9 separately just at that moment in time when
10 the OxyContin reformulation occurred. So my
11 model is already picking that up.

12 You know, I think the other
13 thing is, of course, I'm looking at the
14 opioid market as a whole, not just OxyContin
15 on its own, and so there are -- there are
16 other factors happening for other opioids.

17 BY MR. ROTH:

18 Q. But your model suggests that
19 there was still a supply of opioids and
20 prescribing driven by promotion whereas
21 they're suggesting that the supply was drying
22 up to the extent that users evaded the legal
23 prescription market and turned to illegal
24 drugs.

25 A. I don't believe you're correct

1 in that statement. These models are looking
2 at two very different things. I'm not
3 looking at the use of illicit opioids. The
4 data show decreasing use of legal opioids.
5 That's -- that's just the underlying MMEs, so
6 that is happening.

7 My model is looking at the
8 portion of that that's explained by
9 promotion, so there's no way that this is
10 disproving people had left OxyContin.

11 Q. But it is showing that
12 according to your model, the OxyContin
13 reformulation did not have a statistically
14 significant impact on the MMEs prescribed?

15 A. Once you control for the
16 variables that I've controlled for, including
17 price, including promotion, and accounting
18 for the change in promotional effectiveness,
19 I don't separately find an effect here. That
20 is not the same as saying that OxyContin
21 reformulation had no effect.

22 Q. Okay. So now I want to go back
23 to Appendix D, and I want to start with
24 Table D.1.

25 A. Okay.

1 Q. All right. So Table D.1 --

2 A. Oh. I'm on page D1.

3 Q. Yeah, you've got to go past
4 that.

5 A. Keep going.

6 Q. Talk about your charts and
7 graphs.

8 A. It's okay. Excellent.

9 MR. SOBOL: This one?

10 THE WITNESS: All right.

11 MR. ROTH: Yeah, the table.

12 BY MR. ROTH:

13 Q. So first the chart, okay. So
14 Table D.1 is a chart that I think explains
15 Model A; is that right?

16 A. That's correct.

17 Q. And maybe just explain to me
18 what is on here, because if I try to ask you
19 a question, I'm not going to do as good of a job
20 as if you just tell me what this is showing.

21 MR. SOBOL: If you just ask a
22 direct question.

23 A. Sure. These are SAS output
24 made slightly prettier, and so at the top --
25 the top box there is describing the model

1 overall, degrees of freedom, the total error,
2 the sum of squared errors you see there, the
3 mean squared error. After that, the square
4 root of the mean squared error. These are
5 all sort of talking about the variability in
6 the data and the explanatory power of what's
7 included. The R-squared and the adjusted
8 R-squared are -- the adjusted R-squared
9 accounts for the degrees of freedom, the
10 number of covariants.

11 BY MR. ROTH:

12 Q. And what is in the bottom chart
13 titled Nonlinear OLS Parameter Estimates?

14 A. Yes, so those the coefficient
15 standard error, t statistic, p values. Those
16 are reported way back in Table 1. They've
17 just cleaned up a little bit.

18 So the coefficient estimate is
19 the one that we're interested in, and then
20 we'll mostly just focus on the p value.

21 Q. Okay. So if we flip to Figure
22 D.1 --

23 A. Yeah.

24 Q. -- which is the line graph
25 that's an output, I was perplexed when I saw

1 this because the green line is predicted
2 but-for; is that right?

3 A. That's correct.

4 Q. So you're showing negative
5 but-for in the early '90s and again starting
6 around 2012.

7 Do you see that?

8 A. Yes, that's correct.

9 Q. So what does that mean, that,
10 you know, people were returning opioids? I
11 don't even understand how that conceptually
12 works.

13 A. Yes. Well, remember how I said
14 that Model A uses a single promotional
15 effectiveness and it doesn't fit the data
16 very well? So it's an average that's
17 smoothing over this long period and doesn't
18 fit the data well, so that's what these
19 predictions tell you. It's the same thing,
20 in effect, as looking at the adjusted
21 R-squared. This is just what it looks like
22 in predicted values.

23 Q. So for this reason, Model A is
24 not your preferred approach?

25 A. This is not my preferred model,

1 that's correct.

2 Q. Yeah. I mean, conceptually,
3 having a negative but-for doesn't actually
4 make sense, right?

5 A. Conceptually, it's unappealing.

6 Q. How would you even calculate
7 the difference with a negative but-for?

8 A. The same way. It's -- the
9 difference would be just the space between
10 the two lines. I have not done that here.

11 Q. Okay. So now if you flip the
12 page to Table D.2, you'll see another set of
13 charts.

14 And I think this correlates to
15 your Model B; is that right?

16 A. That's correct.

17 Q. And I assume your description
18 of what Table D.1 is would describe D.2,
19 although this second chart has additional
20 labels for the stock of promotion trends that
21 we talked about earlier?

22 A. That's correct.

23 Q. Why is the stock of promotion
24 dummy trend from August 2010 a negative
25 number?

1 A. Again, it's an erosion rate
2 over the promotional effectiveness in b2, and
3 so the promotional effectiveness is b2 plus
4 the number of months from -- from that time
5 break, August 2010, times b3. So it
6 increments. You see what I'm saying?

7 Q. Yeah.

8 A. So every month, it's like b2 is
9 reduced by 8.

10 Q. Right. And this is your time
11 trend essentially that we talked about
12 before?

13 A. It's sort of an erosion trend,
14 yes.

15 Q. Okay. And why is it -- how did
16 you come up with that number, like how do we
17 get negative 7.97362?

18 A. It comes out of the regression
19 model. It's estimated like all the other
20 coefficients using OLS.

21 Q. And what is it doing? It's not
22 like a Wald statistic? Or is it -- how does
23 it mechanically estimate that coefficient?

24 A. Well, technically through
25 matrix algebra. I mean, it's essentially

1 picking up the association between, in this
2 case, the stock of promotion times the dummy
3 trend and sales. Like all the other
4 coefficient estimates, the tests relate to
5 the statistical properties of those
6 estimates, but the coefficients really come
7 from the correlations.

8 Q. All right. And then if we turn
9 the page to D.2, this is the line graph from
10 your Model B, which maps almost perfectly
11 onto the blue flow of the data.

12 A. Yes.

13 MR. SOBOL: A thing of beauty.

14 MR. ROTH: Almost as if it
15 fitted like a glove. All right.

16 BY MR. ROTH:

17 Q. Let's look at Table D.3.

18 A. Uh-huh.

19 Q. The last one of these. So this
20 is -- well, it's not the last one of these,
21 we'll ask about that in a second, but this
22 is, I think, Model C.

23 A. That's right.

24 Q. Okay. So the same concept as
25 D.1 and D.2 we just walked through?

1 A. Yes.

2 Q. And then if you look at the
3 second page, it looks like this one has
4 something that says Type, Wald Test -- Test
5 and Test0. What is that?

6 A. That's the joint test of
7 significance of those events.

8 Q. Got it. Okay.

9 So when you say in your report
10 jointly they're not statistically
11 significant, it's based on this output?

12 A. Yes, except that that was in
13 the errata, that that should have said they
14 were significant.

15 Q. I saw that. That was the one
16 errata where it changed like a no to a yes
17 and there was --

18 A. Yes. It does not change my
19 conclusions, but yes, you can see here the p
20 value is .0176.

21 Q. Okay. So just to be clear,
22 your opinion is that jointly the five events
23 are actually statistically significant?

24 A. That's correct.

25 Q. Okay. And then if we look at

1 D.3, Figure D.3, this is what your curve
2 looks like in Model C?

3 A. Yes.

4 Q. Okay.

5 A. Not very different from
6 Model B.

7 Q. Which makes sense because the
8 baseline is Model B; you're just inserting
9 five events and measuring those?

10 A. Yes. If they had had some
11 effect, it might have looked different.

12 Q. Okay. You can -- looking at
13 your report again, so we talked about this
14 earlier, but you cited Datta and Dave, and we
15 talked about that article this morning.

16 Do you remember that?

17 A. I do.

18 Q. So let's pull it out one more
19 time. Probably the last one.

20 A. Let me make sure that I get the
21 right...

22 Q. It's Exhibit...

23 A. 5. Got it.

24 Q. 5.

25 So if you look with me at

1 page 452 again, we're now going to get to
2 talk about endogeneity.

3 A. Excellent.

4 Q. You knew it was coming.

5 A. I did.

6 Q. So at the top of the page, they
7 say: A key empirical concern in this
8 literature relates to potential targeting
9 bias, which physicians who already have a
10 history of prescribing a particular drug or
11 who have a higher unobserved likelihood of
12 prescribing the drug (for instance, due to
13 their patient population or practice type)
14 more likely to be targeted by detailers.

15 Do you see that?

16 A. I do.

17 Q. And is that an empirical
18 concern that you as an econometrician or
19 economist would have?

20 A. If I were doing a
21 physician-level study, yes.

22 Q. And one could describe this
23 issue as something called endogeneity?

24 A. Yes.

25 Q. And can you define endogeneity

1 for us?

2 A. Well, in effect, what they're
3 talking about here, I described earlier this
4 morning the endogeneity they're concerned
5 about is of the type that physicians who are
6 more likely to be detailed are already more
7 likely to be open to prescribing or are, in
8 fact, high prescribers already.

9 Q. And it's called endogeneity
10 because that's an endogenous problem?

11 A. Yes. The level of detailing is
12 endogenously determined with the level of
13 prescribing.

14 Q. So continuing on their paper,
15 they say "Addressing such endogeneity is a
16 vital issue in identifying plausibly causal
17 effects of advertising, which would otherwise
18 lead to overestimates of the advertising
19 response.

20 Do you see that?

21 A. I do see that.

22 Q. And --

23 A. And as I said before, it's
24 because they're talking about physician-level
25 data.

1 Q. Which you didn't look at?

2 MR. SOBOL: Objection, asked
3 and answered.

4 A. It was not relevant to my
5 report because I have been asked to conduct
6 an aggregate analysis.

7 BY MR. ROTH:

8 Q. And then they say: Studies
9 that address this endogeneity in most cases
10 have done so through an instrumental
11 variables-based methodology, although as
12 Bronnenberg caution, many of the instruments
13 employed have limited variation and may not
14 fully satisfy the validity requirements.
15 This caveat notwithstanding, these studies
16 generally find a smaller marginal effect of
17 detailing relative to those that do not
18 account for endogeneity.

19 Do you see that?

20 A. I do.

21 Q. Now, what about having an
22 aggregate macro analysis means that
23 endogeneity is no issue for you?

24 MR. SOBOL: Objection.

25 A. Well, endogeneity is something

1 different in every context, so what they're
2 describing specifically here, I mean, I think
3 they say that they're talking about targeting
4 bias, so that's the physician-level concern.

5 It simply doesn't exist in my
6 data because I'm not looking at
7 physician-level data. I cannot mistake the
8 fact that Doctor A has high prescriptions
9 compared to Doctor B, not because she's been
10 detailed before, but she's been detailed
11 before because she has high prescriptions.
12 Because I'm only looking at the aggregate.
13 So the only kind of endogeneity there, it
14 can't be related to targeting. It has to be
15 related to something else.

16 In other instances people have
17 looked at endogeneity when it comes to a
18 specific product. They said, well, you know,
19 we knew that this product was going to be a
20 blockbuster so we put our detailing on
21 product A versus product B, and so that's the
22 nature of the endogeneity. But again, I
23 don't have that here because I'm aggregating
24 across products.

25 ///

1 BY MR. ROTH:

2 Q. It's a convenient answer to
3 everything, but I want to dissect that.

4 The data you're looking at --

5 MR. SOBOL: Well, objection to
6 that.

7 BY MR. ROTH:

8 Q. The data you're looking at from
9 IQVIA is an aggregation of detailing contacts
10 to doctors, correct?

11 A. The details were made to
12 doctors, yes.

13 Q. Or healthcare providers.
14 Actually, could have been nurse
15 practitioners, as we talked about earlier?

16 A. Yes.

17 Q. Why is it that adding up a
18 whole suite of contacts to doctors is any
19 less susceptible to the fact that certain
20 doctors are more likely to be detailed in the
21 first place than looking at it on a
22 disaggregated individualized basis?

23 A. You're making me feel like I'm
24 failing as a teacher. Let me try again.

25 MR. SOBOL: Yeah.

1 A. It's the fact of measuring,
2 detailing and prescribing at the doctor level
3 and trying to examine that specific
4 relationship that's causing the endogeneity
5 problem.

6 So imagine that -- I'm trying
7 to give a work example for you, but I mean,
8 the concern again is that the patterns of
9 high prescribing that we're observing between
10 doctors are really causing detailing and not
11 the other way around.

12 But if I am ignoring those
13 patterns, the only thing that I'm looking at
14 is increases over time. Those -- the forces
15 that say which doctors get detailed are just
16 not -- they're not in my data.

17 So it's like doing an
18 intent-to-treat analysis, if that means
19 anything to you. We have clinical studies
20 where we know that some patients will be
21 compliant and some won't, and if we only look
22 at the effect of the drug on the compliant
23 patients, we're going to misstate its
24 population effect, so we look at all
25 patients.

1 That's basically what I'm doing
2 is it may well be that targeting is happening
3 here. If that is true, then the aggregate
4 effect will be small. In the extreme, where
5 promotion doesn't work at all, it just --
6 detailing -- we just, you know, detail the
7 doctors we know are going to prescribe, then
8 I would find no effect in the aggregate.
9 Even though you would find an effect in the
10 cross-section, you won't find it in the
11 aggregate.

12 BY MR. ROTH:

13 Q. We may have to agree to
14 disagree on this one for now. I can't
15 promise we won't come back.

16 Do you agree that when
17 endogeneity is an issue, it's typically
18 handled through instrumental variables?

19 A. Yes, that is a classic
20 approach. In effect, the instrumental
21 variables are trying to step back from --
22 from that targeting to get to something that
23 is, in fact, exogenous.

24 Q. Are there other options for
25 addressing endogeneity?

1 A. Well, generally, there's sort
2 of broader research design, so ultimately,
3 endogeneity concerns some kind of unmeasured
4 third variable. I mean, there's simultaneity
5 that has to do with sort of a different
6 interpretation of endogeneity, but what we're
7 talking about here is something else that
8 we're not measuring. So endogeneity can be
9 addressed by measuring whatever that thing
10 is. So in the case of Datta and Dave, it
11 could be historic prescribing.

12 Q. Did you take any effort to test
13 for endogeneity issues or address endogeneity
14 issues in your regression analyses?

15 A. Again, conceptually, I don't
16 believe this is an issue looking at the
17 overall opioid market over time, so I did not
18 address endogeneity in my model.

19 Q. Do you know if anyone on your
20 team did?

21 A. I do not.

22 Q. You've used the instrumental
23 variables methodology to correct for
24 endogeneity in other models you've developed
25 for litigation, correct?

1 A. In looking at a single drug,
2 yes. As I mentioned, there's another version
3 of the endogeneity story that makes sense for
4 a single drug.

5 Q. So in Zyprexa, I think, for
6 example, you used instrumental variables?

7 A. I'm afraid that was a long time
8 ago. I didn't review that report for that.

9 Q. I can mark it just so we have
10 it in the record.

11 (Whereupon, Deposition Exhibit
12 Rosenthal-12, Rosenthal Declaration
13 re: Zyprexa, was marked for
14 identification.)

15 BY MR. ROTH:

16 Q. Exhibit 12 is your --

17 A. Wow.

18 Q. -- declaration from Zyprexa,
19 Analysis of Class-Wide Impact and Estimation
20 of Damages.

21 MR. SOBOL: Oh, wow. Memories.

22 A. I'm trying to -- do you know
23 what the date on this is?

24 BY MR. ROTH:

25 Q. It is February 2007.

1 A. Wow.

2 Q. 12 years ago.

3 A. That is a really long time ago.

4 Yes.

5 Q. Okay. And if you look at your
6 Zyprexa declaration -- and I will stipulate
7 this is an excerpt, we didn't print the whole
8 thing, but at paragraph 35 you talk about the
9 fact that you developed a regression model,
10 and then the equations in paragraph 37.

11 Do you see that?

12 A. Yeah, I was just looking at --
13 I was trying to remember whether this is a
14 panel data model or not, but --

15 MR. SOBOL: Well, take your
16 time then to refresh your recollection
17 of your model from 12 years ago.

18 THE WITNESS: I will. Yes.

19 A. Yes, this is a panel data model
20 for the atypical antipsychotic class.

21 BY MR. ROTH:

22 Q. And if you were to try to
23 assess the effect of any individual
24 defendants' promotion in this case, would you
25 put together a panel data model similar to

1 the one you used in Zyprexa to do that?

2 A. I have not thought about doing
3 defendant-by-defendant analysis in this case.
4 It was not part of my assignment. I'm not
5 sure if that would be appropriate, again,
6 because the interest here, even if we're
7 looking at individual defendants, is on the
8 overall -- on the market expansion aspect of
9 their marketing.

10 Whereas in Zyprexa, we were
11 very interested in the -- I'm trying to
12 remember what words we used this morning --
13 business dealing is the way economists
14 usually describe it. Marketers describe it
15 something differently, but the market share
16 shifts, those were relevant in Zyprexa
17 because the question was not so much that
18 Zyprexa was trying to grow the market,
19 although there was some of that. It was
20 about trying to encourage doctors to
21 substitute Zyprexa in place of
22 first-generation antipsychotics.

23 Q. For a manufacturer that was not
24 part of the market before it grew and came
25 into the market after it had been expanded,

1 why is it the case in your model that that
2 manufacturer is part of the aggregate
3 analysis and not subject to some other type
4 of causation allocation?

5 MR. SOBOL: Objection, asked
6 and answered.

7 A. Nowhere in my assignment was I
8 asked to look at liability for individual
9 manufacturers. I'm only trying to quantify
10 aggregate impact. To the extent that I
11 subtract individual defendants, it's really
12 only to get to a different whole, it's not to
13 assign liability to an individual defendant.

14 BY MR. ROTH:

15 Q. So looking at the Zyprexa
16 declaration, paragraph 42, you say: For
17 purposes of the regression, the promotional
18 variables for Zyprexa and its competitors
19 were entered as discounted stocks following
20 the tendency of the published literature and
21 in accordance with the theory that promotions
22 to physicians is habit building.

23 Do you see that?

24 A. I do.

25 Q. So you used a stock of

1 promotion with a depreciation rate similar to
2 here?

3 A. At least I'm consistent, yes.

4 Q. No doubt.

5 And then you also used a Fisher
6 Ideal Price Index in that case too?

7 A. I did.

8 Q. But you weren't consistent
9 next, because then you say: In addition, the
10 estimation deals with two important issues,
11 serial correlation in the error terms and the
12 endogeneity of price and promotion. Serial
13 correlation in the error terms require the
14 use of time series methods to produce
15 reliable estimates. The endogeneity of price
16 and promotion was handled using the standard
17 instrumental variables approach.

18 Did I read that correctly?

19 A. Yes, you did.

20 Q. And if endogeneity is an issue
21 for you -- I understand you don't think it
22 is -- but if it is an issue for you, your
23 regression may lead to overestimating the
24 response to promotion?

25 MR. SOBOL: Well, then,

1 objection.

2 A. I do not believe endogeneity is
3 an issue in my model for the reasons that
4 I've described. But in particular, what
5 we're looking at is an aggregate phenomenon,
6 and so the theory of endogeneity that we
7 would have to have requires this reverse
8 causation on a month-by-month basis for the
9 market as a whole, and I do not believe
10 that's a plausible notion.

11 BY MR. ROTH:

12 Q. Okay. Don't fight the
13 hypothetical, though.

14 Assume endogeneity is an issue
15 with your model. What impact would it have?

16 MR. SOBOL: Objection, asked
17 and answered.

18 A. I cannot imagine a form of
19 endogeneity that would make sense in this
20 case. I cannot understand how it could be
21 that one month's sales could have caused the
22 next month's detailing to change in the way
23 that endogeneity requires. It's simply not a
24 plausible set of ideas in this context.

25 ///

1 BY MR. ROTH:

2 Q. And why is that again?

3 A. Because we're looking at the
4 market as a whole, and not individual
5 manufacturers or individual drugs, where
6 those decisions are made.

7 Q. I guess I'm confused, because
8 earlier you talked about us as this
9 manufacturing ecosystem that all kind of acts
10 together, but now for purposes of
11 endogeneity, you're saying there are no
12 issues because we're not looking at it on an
13 individualized basis, and I can't square
14 those two things. Maybe you can help.

15 A. Sure.

16 MR. SOBOL: I'll object to the
17 form, but go for it.

18 A. Sure. I think where you're
19 confused is the ecosystem is causing
20 prescribing in a way that may be concerted,
21 but I -- I don't believe anywhere I have said
22 that the defendants are aligning, explicitly,
23 their marketing efforts.

24 BY MR. ROTH:

25 Q. Okay. Do you remember if you

1 used an instrumental variables approach to
2 address endogeneity in Neurontin?

3 A. All not quite 12 years ago, 17,
4 however many, but I believe the answer is
5 yes, in the circumstance of -- thank you, can
6 you remind me -- the circumstance is very
7 similar to the Zyprexa matter.

8 Q. Yes, so we can do this one
9 quickly.

10 A. Yes.

11 Q. But Exhibit 13 is your
12 Neurontin declaration, excerpted.

13 (Whereupon, Deposition Exhibit
14 Rosenthal-13, Rosenthal Declaration
15 re: Neurontin, was marked for
16 identification.)

17 A. It's in Calibri too.

18 BY MR. ROTH:

19 Q. It must be the Greylock
20 computers. Did Greylock McKinnon assist you
21 there?

22 A. Yes.

23 Q. August 2008.

24 So looking at your Neurontin
25 declaration, you were addressing alleged

1 fraudulent promotion on behalf of the class
2 plaintiffs; is that right?

3 MR. SOBOL: Actually, may I
4 just interrupt one second? Sorry.

5 So is this pulled online or --
6 it indicates confidential in the
7 bottom left-hand corner.

8 MS. VENTURA: It's available
9 online.

10 MR. ROTH: Yeah, we got it
11 online.

12 MR. SOBOL: Okay, go ahead.

13 THE WITNESS: Zyprexa too?

14 MR. ROTH: I think so. I did
15 ask that question.

16 MR. SOBOL: Zyprexa had at the
17 top an ECF thing. This one didn't.
18 That's why I asked. I'm sorry. Go
19 ahead.

20 BY MR. ROTH:

21 Q. So in Neurontin, you offered
22 opinions on behalf of the class plaintiffs
23 related to the defendants' promotion; is that
24 right?

25 A. And coordinated plaintiffs -- I

1 was just trying to see -- yes, that's right.

2 Q. And then your regression is in
3 paragraph 34.

4 A. Yes.

5 Q. And then in paragraph 40, under
6 Prices, there's a sentence toward the end
7 that says: The endogeneity of price and
8 promotion was handled using the standard
9 instrumental variables approach.

10 A. Yes, that's correct.

11 Q. And that's actually a different
12 endogeneity than what Datta and Dave were
13 describing.

14 A. That's correct.

15 Q. And is that endogeneity an
16 issue for you here?

17 A. I think again, because we're
18 looking at a market average set of prices,
19 that that is not the same as thinking about
20 the simultaneity of price and quantities for
21 an individual manufacturer.

22 Q. Okay. I've got one more source
23 for you. We're just taking the time machine
24 into the farther back.

25 A. Oh my gosh, is there farther

1 back? Yes.

2 (Whereupon, Deposition Exhibit
3 Rosenthal-14, 2003 Kaiser Family
4 Foundation Report, was marked for
5 identification.)

6 BY MR. ROTH:

7 Q. Exhibit 14, Demand Effects of
8 Recent Changes in Prescription Drug
9 Promotion, the Kaiser Family Foundation, and
10 you are one of the authors.

11 Do you see that?

12 A. I do.

13 Q. And Professor Berndt is a
14 co-author of yours.

15 A. That is correct.

16 Q. And in this article, it looks
17 like you're analyzing whether increases in
18 direct-to-consumer advertising increased the
19 market share of an entire therapeutic class,
20 right?

21 A. Yes. So maybe just briefly,
22 this analysis is a panel data study. We have
23 a couple of years of data, I think three
24 years of data, for five different classes of
25 drugs. And we do the analysis both at the

1 class level and then at the individual
2 product level.

3 Q. But at least a part of this was
4 aggregated, correct?

5 A. At the class level, yes.

6 Q. Okay. Let's look at page 14.

7 MR. SOBOL: What about page 1?
8 It's got a quote from Kessler on it.

9 MR. ROTH: Look at that,
10 David A. Kessler, along with laureates
11 Thomas Jefferson and F. Scott
12 Fitzgerald.

13 THE WITNESS: It would not be
14 appropriate to comment on the
15 quotations in this paper.

16 BY MR. ROTH:

17 Q. So page 14 --

18 MR. ROTH: Hold on.

19 (Comments off the stenographic
20 record.)

21 BY MR. ROTH:

22 Q. Hold on, Professor. I am on
23 the wrong page, I think.

24 A. Okay.

25 Q. Or hopefully not on the wrong

1 article, but it could be.

2 (Document review.)

3 BY MR. ROTH:

4 Q. Okay. It's actually page 12.

5 A. Okay.

6 Q. I was looking for a sigma,
7 which was a dead giveaway that I was on the
8 wrong page.

9 A. Okay. Excellent.

10 Q. Okay. And I think it's because
11 this is probably a reprint from the journal,
12 so I'm looking at a snapshot of the journal
13 in my outline.

14 A. I see.

15 Q. Okay. But now we're on the
16 same page, the section that says Basic
17 Models.

18 A. Okay.

19 Q. Do you see that?

20 A. I do.

21 Q. It says: We now set out the
22 basic estimation models used in the analysis.
23 As noted above, the Cobb-Douglas formulation
24 is used for both the class level demand model
25 as well as the individual product demand

1 model.

2 Do you see that?

3 A. I do.

4 Q. So it's both class and
5 individual, and then you've got your equation
6 below it.

7 Do you see that?

8 A. I do.

9 Q. And can you say it in words?
10 Because you did such a nice job earlier and I
11 don't read algebraic.

12 A. Sure. Well, that Cobb-Douglas
13 specification has natural logs on both sides,
14 and so it has the log of quantity sales is a
15 function of alpha, beta-1 times the log of
16 direct-to-consumer advertising plus beta-2
17 times the log of detailing plus the other
18 coefficients at times their values.

19 Q. So I'll take a detour because I
20 had another question about this for you
21 later.

22 A. Okay.

23 Q. So by "log," you mean
24 logarithmics, right?

25 A. That's correct.

1 Q. And there's a difference
2 between using logarithmics or some
3 non-logarithmic variable in a regression
4 model?

5 A. Yes. You make logarithmic
6 sound so poetic, but yes, it is -- generally
7 when we use logs, we're trying to collapse
8 across the orders of magnitude, and it
9 frequently permits interpretation of results
10 in terms of proportions.

11 These log-log models have this
12 specific Cobb-Douglas production function
13 under them, which is just something that is
14 frequently used in economics.

15 Q. Got it.

16 So it says -- and then you have
17 this general specification of a modified AIDS
18 model.

19 A. That's correct.

20 Q. And below that, it says after
21 explaining that model: Finally, we use the
22 same right hand side variable in estimating
23 model specifications where the dependent
24 variable is specified as the logit of
25 quantity squares for the individual drug

1 products.

2 Do you see that?

3 A. Yeah. That's the logit.

4 Q. Legit, sorry.

5 A. It's all right. Logit.

6 Q. With an O, not an E.

7 A. It's a transformation.

8 Q. All right. So now if you look
9 at page 14, it says: We take account of the
10 possibility that spending on DTCA and
11 physician promotion and product sales are
12 jointly determined by estimating
13 instrumentable -- instrumental variables, IV,
14 models where all three variables are assumed
15 to be endogenous.

16 Do you see that?

17 A. Yes.

18 Q. And that's solving for an
19 endogeneity issue?

20 A. That's correct. This, again,
21 is at the product level.

22 Q. And if you had done an analysis
23 at the drug- or geography-specific level,
24 this is an approach you might have had to
25 take?

1 A. I did not do such an analysis
2 for -- based on my assignment, and so I
3 really haven't sat and thought about it.

4 But this model I believe is
5 appropriate for a product-level model, again
6 notwithstanding the challenges in estimating
7 instrumental variables in general.

8 Q. So even if you're right, that
9 selection isn't an issue because it's an
10 aggregate model at the prescriber level,
11 aggregate promotion across all manufacturers
12 could still be determined at least in part by
13 sales in the aggregate, right?

14 MR. SOBOL: Objection.

15 A. Well, again, conceptually, and
16 ultimately endogeneity is a conceptual issue
17 about how we understand the market to be
18 working.

19 Conceptually, it makes no sense
20 to me to think about an aggregate price being
21 set by anyone because it is looking across a
22 wide range of companies and products, and so
23 in terms of the price endogeneity, that is
24 literally about strategic decisions of
25 individual firms and I don't think it

1 translates into the aggregate level.

2 Likewise, when it comes to
3 detailing, we're assigning the detailing to
4 the class as a whole and it's not the class
5 as a whole that's deciding a detailing
6 budget. That's for an individual
7 manufacturer at the product level.

8 So conceptually, I think
9 they're disconnected.

10 BY MR. ROTH:

11 Q. Okay. But if we assume that
12 pharmaceutical companies are economically
13 rational actors, it would make sense for them
14 to consider recent sales performance when
15 setting promotional budgets?

16 A. I again -- I guess I can just
17 say it again, that pharmaceutical
18 manufacturers, the concern is that they're
19 looking -- they're anticipating their own
20 sales growth and setting detailing based on
21 that.

22 While that may make sense for
23 an individual manufacturer, I -- even though
24 those decisions are rolled up in my
25 aggregate, the aggregate then is one step

1 removed from the timing of those decisions
2 and so the concern that the factors that
3 determined the level of detailing for the --
4 for the market as a whole in that month are
5 the same as determined as sales, to me that
6 makes no sense.

7 Q. Okay. If you were to use an
8 instrumental variables approach, instruments
9 for promotion would need to be correlated to
10 promotion; is that right?

11 A. In general, in an instrumental
12 variable approach, you need instruments that
13 predict the endogenous variable and only
14 affect the variable of interest through the
15 endogenous variable and not on their own.

16 Q. Okay.

17 (Whereupon, Deposition Exhibit
18 Rosenthal-15, Regression Instruments
19 Spreadsheet, was marked for
20 identification.)

21 BY MR. ROTH:

22 Q. I'm going to mark as Exhibit 15
23 a document that was produced along with your
24 backup materials, and it says Regression
25 Instruments, Checked on July 24th, 2018.

1 A. Yes.

2 Q. Do you see this?

3 A. I do.

4 Q. So that's in part why I asked
5 you before if you knew about this.

6 A. This is not part of my
7 analysis. So as you may know, I was retained
8 in the middle of the summer, so this was not
9 part of the analysis that you see in my
10 report.

11 Q. So who would have performed
12 this regression instruments analysis on your
13 models, if not you?

14 A. Presumably the staff began
15 gathering these data.

16 Q. So at least someone on the
17 staff thought that endogeneity might be an
18 issue if they determined to run this analysis
19 in July 2018?

20 MR. SOBOL: Objection.

21 A. Like you, they may have been
22 operating on my past analyses and started to
23 collect the data on that basis.

24 BY MR. ROTH:

25 Q. And I know your position is

1 that this didn't need to be done, but if you
2 look at the nine variables on Exhibit 15,
3 some of these look familiar from your
4 Neurontin report, but others are not ones I
5 recognize.

6 Can you comment on that?

7 MR. SOBOL: Objection.

8 A. Well, I haven't seen this.
9 Again, like you, I can imagine my staff would
10 have gone back to my last report, maybe not
11 quite as old as these, and looked at the
12 instruments that were gathered for those
13 reports.

14 Generally speaking, these look
15 similar in that they are consumer price and
16 producer price indexes, indices, and wage
17 index. They look familiar to the ones that
18 we've used in the drug-level studies.

19 BY MR. ROTH:

20 Q. So you didn't do this or see
21 this before just now?

22 A. I -- I did not see this, no.

23 Q. Okay. And your view is you
24 have no endogeneity issues because you've
25 done an aggregate model, and pricing is not

1 an issue either, so we don't need to use
2 instrumental variables on your model.

3 MR. SOBOL: Objection, asked
4 and answered.

5 A. As I sought to address my
6 assignment, it was my belief that we should
7 use an aggregate model and that in doing so,
8 the endogeneity issues around the timing of
9 and extent of detailing for specific drugs
10 would not be pertinent.

11 BY MR. ROTH:

12 Q. Did you conduct any study or
13 analysis to evaluate whether the
14 manufacturers' detailing targeted physicians
15 with a history of prescribing their drugs?

16 A. I'm sorry, could you repeat
17 that? That was a long sentence.

18 Q. Did you conduct any study or
19 analysis to evaluate whether the
20 manufacturers' detailing targeted physicians
21 with a history of prescribing their drugs?

22 A. Not specific analysis. I would
23 have to review my report carefully to see if
24 I don't cite documents. It is -- in the
25 course of my work on pharmaceutical matters,

1 I have been aware that manufacturers do, in
2 fact, target high prescribers.

3 Q. And I think we've seen
4 throughout today you've relied on Dr. Perri.

5 A. Dr. Perri, of course, is a
6 pharmaceutical marketing expert, and I
7 certainly cite him on those matters.

8 I have my own general working
9 knowledge, having seen many documents in the
10 course of discovery about targeting efforts.

11 (Whereupon, Deposition Exhibit
12 Rosenthal-16, 3/25/19 Perri Expert
13 Report, was marked for
14 identification.)

15 BY MR. ROTH:

16 Q. I'm going to hand you
17 Exhibit 16, which is an excerpt of
18 Dr. Perri's report. And if you look at page
19 42 -- sorry, paragraph 42, which is at
20 page 23. Do you see that?

21 A. Yes.

22 Q. He says: Marketers frequently
23 target prescribers who are most likely to
24 prescribe their drug. Marketers identify
25 prescribers using commercially available

1 data, which groups prescribers, for example,
2 into deciles reflecting lower versus higher
3 levels of prescribing.

4 Do you see that?

5 A. I do.

6 Q. And then it says: Marketers
7 use this information to select prescribers,
8 or groups of prescribers, as target
9 customers. Targeting high-decile (more
10 frequent prescribing) prescribers is
11 consistent with marketing principles because
12 it effectively targets customers with
13 potential to generate sales. Defendants used
14 deciles to identify the best physicians for
15 their PSRs to use in sales plan -- sales call
16 planning.

17 Do you see that?

18 A. I do. I think that's exactly
19 what I have said.

20 Q. And you agree with that. Your
21 point is just when you aggregate everything,
22 you don't need to account for the targeting
23 issue?

24 MR. SOBOL: Objection.

25 A. If I -- if I were looking at

1 individual physician data, it would be
2 important to account for this. I am not, and
3 therefore this concern does not pertain to my
4 analysis.

5 BY MR. ROTH:

6 Q. Okay. Did you consider any
7 methods to test causation that are not
8 included in your report?

9 MR. SOBOL: Well, other than
10 drafts, right? How do we even
11 navigate that?

12 BY MR. ROTH:

13 Q. I mean, I guess what -- the
14 only -- I'll ask it this way.

15 The only tests for causation of
16 your model are contained in your report? Let
17 me strike that. That's a bad question. I'll
18 just -- I don't need to get drafts. I'm not
19 trying to get at that.

20 Did you consider whether you
21 could leverage any natural experiments to
22 determine whether MMEs were impacted by
23 promotion?

24 A. Because my assignment related
25 to the whole of this period of interest --

1 well, the logical research design to examine
2 the effect of 20-some-odd years of promotion
3 is the one I have done.

4 I was going to say in some
5 sense the indirect analysis and my Section X,
6 which I assume will be a Sunday afternoon
7 activity, is like a natural experiment,
8 right? It's saying what would have happened
9 absent promotion.

10 Now, how would all other
11 factors have driven this forward? Those are,
12 in effect, event studies.

13 Q. It's a thought experiment, but
14 it's not like a regression analysis or event
15 study.

16 MR. SOBOL: Objection.

17 A. Well, the -- of course the
18 indirect model uses a regression to establish
19 which factors seem cross-sectionally
20 associated and then trends that forward, so
21 the causal part is in the cross-section.

22 It's hard to imagine an event
23 study of another kind that would be
24 appropriate to capture the effect of the
25 alleged misconduct from 1995 through 2018, so

1 I don't think I considered it.

2 BY MR. ROTH:

3 Q. Did you consider a
4 difference-in-differences approach?

5 A. Again, because the alleged
6 misconduct in this matter pertains to all
7 marketing from 1995 to 2018, there wasn't an
8 obvious difference-in-difference approach
9 that I thought would make sense here.

10 Q. Did you run your model
11 switching the dependent and independent
12 variables to see if MMEs predict detailing?

13 A. No, I did not.

14 Q. And that would be a test for
15 reverse causation; is that right?

16 A. I'm not sure that would be the
17 best test for a reverse causation, but it
18 certainly is literally a reverse model.

19 Q. Did you run a model including a
20 lead of detailing contacts from the next
21 month as an independent variable to see if
22 future detailing predicted current MMEs?

23 A. I did not, no.

24 Q. Did you do any test of reverse
25 causation?

1 A. I did not.

2 Q. And what would it mean if there
3 was a significant positive relationship
4 between future detailing and current MMEs?

5 MR. SOBOL: Objection.

6 A. Well, again, I proceed on this
7 question of endogeneity from a conceptual
8 basis. I struggle a bit with thinking about
9 exactly what it would mean. On the -- at the
10 individual drug level, I think there's a
11 clear story. At the aggregate level, it's a
12 lot less clear to me.

13 BY MR. ROTH:

14 Q. Okay. If there comes a point
15 in time when, for whatever reason, certain
16 defendants are not part of the trial, is it
17 your intention to use your aggregate model
18 along with Table 3 to identify causation
19 percentages for the remaining defendants, or
20 do you have some other approach in mind?

21 MR. SOBOL: Objection.

22 A. Well, the reason that I
23 undertook the analysis for Table 3 was that I
24 was asked by counsel if it was possible to
25 remove one of the defendants or any group of

1 the defendants from the measure of impact
2 that I use, and so I did that by removing
3 their marketing from the calculation, which
4 is, in effect, leaving it in the but-for
5 scenario.

6 And so do I know for sure that
7 that's the way the court will ultimately want
8 to remove a defendant? I don't know for
9 sure, but that was what -- I was asked if I
10 could do that by counsel in order to
11 demonstrate one way that the model could be
12 adapted for fewer defendants.

13 BY MR. ROTH:

14 Q. I'm going to switch gears and
15 talk about your price index for just a few
16 minutes.

17 A. Okay. Sure.

18 Q. Do you know whether the price
19 index you calculated is increasing or
20 decreasing over time? And feel free to refer
21 to the --

22 A. Yes, it doesn't change much.
23 It does increase slightly over time.

24 Q. How does that square with the
25 fact that the share of generics relative to

1 branded drugs was also increasing over the
2 same period of time?

3 A. Oh, sure. Well, you're asking
4 me about my favorite subject, which is drug
5 pricing. So even though the share of
6 generics may be increasing, the price of
7 those generics is also increasing; and
8 there's a bolus of people who are already on
9 generics, so as the price of generics
10 increases, the price index increases. And
11 then, of course, there are new drugs and line
12 extensions, and those are priced higher and
13 higher.

14 So all of those forces together
15 are getting us to -- it's a very low rate of
16 increase, but it is slightly positive.

17 Q. And did that index measure the
18 actual prices, or was that derived through
19 some equation, the Fisher Ideal Price Index
20 you use in your model?

21 A. The Fisher Price -- Fisher
22 Ideal Price Index, sorry, not Fisher Price.
23 It's late --

24 Q. That's where our heads should
25 be on Saturday, but we're all hanging out

1 here.

2 A. Yes, right. Exactly.

3 Q. Let me ask a clean question.

4 A. Okay.

5 Q. Did the Fishiarial [phonetic]
6 Pricing -- Ideal Price Index used in your
7 model look at actual opioid prices, or was it
8 derived through some equation?

9 A. It looks at actual transaction
10 prices for opioids.

11 Q. Okay. What is the unit of
12 measure you used in calculating the price
13 index?

14 A. The price index is weighted on
15 MMEs.

16 Q. It's not weighted on extended
17 units?

18 A. Well, I should check, but -- I
19 should not do anything by memory. Let me
20 look in my report. I apologize.

21 Q. It would be logical if it were
22 weighted by MMEs, but I think it might be
23 weighted by extended units, so you should
24 check.

25 A. Let me check.

1 (Document review.)

2 A. It's weighted by extended
3 units. Yes.

4 BY MR. ROTH:

5 Q. Would it not be more logical to
6 weight it by MMEs, given that that's your
7 dependent variable?

8 A. Well, given that MMEs and
9 extended units track almost perfectly, I
10 think it would make no difference. And I of
11 course run the model both with MMEs and with
12 extended units, so it happens to be using
13 extended units.

14 Q. But you haven't run your price
15 index with MMEs to see what that would look
16 like?

17 A. I haven't seen that, no.

18 Q. And we talked about the
19 potential endogeneity issues with pricing. I
20 take it you have not run instruments on your
21 pricing index?

22 A. Again, because I'm using an
23 aggregate model and, in fact, the total
24 quantity and total prices are not
25 simultaneously determined in the market as a

1 whole, I do not believe it is necessary.

2 MR. ROTH: I think we should
3 take another five-minute break.

4 THE WITNESS: Okay.

5 THE VIDEOGRAPHER: The time is
6 3:35 p.m. We're now off the record.

7 (Recess taken, 3:35 p.m. to
8 3:50 p.m.)

9 THE VIDEOGRAPHER: The time is
10 3:50 p.m. We're back on the record.

11 BY MR. ROTH:

12 Q. So we started the day with a
13 long discussion of factors that influenced
14 doctors' prescribing decisions. Do you
15 remember that?

16 A. I do.

17 Q. All right. I want to take it a
18 step broader.

19 What are the factors that drive
20 sales of prescription opioids?

21 A. Well, the factors that I
22 account for in my direct model are price and
23 promotion; and promotion, of course, is the
24 most important driver of overall sales.

25 Q. But there are other drivers

1 apart from price and promotion for opioid
2 sales; is that right?

3 A. I think when we talk about
4 drivers, I think it's important to be careful
5 to distinguish between things that may
6 determine whether a particular patient or
7 doctor receives or prescribes an opioid
8 versus what increases the size of the market
9 over time. And when it comes to the latter,
10 I think promotion is really the dominant
11 factor.

12 Q. Would opioid sales still occur
13 if they were never promoted?

14 A. Do you mean never from the
15 beginning of time? Perhaps at some level.
16 But when we are talking about this class that
17 has been promoted for many years, I think
18 just stopping it at a point in time wouldn't
19 result in those sales being eliminated.

20 Q. You have a but-for world that
21 eliminates promotion from the world, then you
22 still find there are opioid sales, right?

23 A. I have a but-for world that
24 eliminates promotion for the defendants, for
25 that period of time, although I start my

1 analysis earlier so the stock of promotion
2 has a chance to build up somewhat.

3 So yes, I don't -- I clearly
4 don't drive sales to zero with that
5 reduction.

6 Q. And you said, I think, your
7 direct model includes only promotion and
8 prices as the two variables.

9 A. As the two explicitly covered
10 variables, yes.

11 Q. Do socioeconomic factors
12 influence sales of opioids?

13 A. When it comes to the trends, if
14 they have any effect, it's very small. And
15 that's really captured in the indirect model
16 when we look at that. It's a little easier
17 to have that conversation when we have those
18 data in front of us.

19 But I think they do very little
20 to explain the expansion of the market over
21 time, as opposed to they do explain some of
22 the cross-sectional variation in opioid use.

23 Q. Do demographic factors impact
24 the sale of opioids?

25 A. Demographic factors, like

1 socioeconomic factors, may well explain some
2 cross-sectional variation. Older populations
3 maybe have a higher incidence of cancer and
4 therefore more opioids.

5 But over time, even though
6 people do worry about the aging of the
7 population, it's an extremely slow
8 phenomenon; and again, in the indirect model,
9 those age variables do very little to
10 increase the sales of opioids.

11 Q. Do healthcare factors impact
12 the sale of opioids?

13 MR. SOBOL: Objection to form.

14 A. Health -- healthcare factors
15 such as -- perhaps do you mean insurance,
16 health insurance? We talked a little bit
17 about that this morning.

18 Again, there will be
19 cross-sectional differences between people's
20 coverage, and that will surely determine
21 whether some patients ever go to the
22 physician and therefore get a prescription.
23 So as a cross-sectional matter, those may
24 have some explanatory variable.

25 In the indirect analysis, we

1 see that driving very little of the change.

2 BY MR. ROTH:

3 Q. And as you pointed out, you
4 modeled socioeconomic, demographic and
5 healthcare factors in your indirect model.

6 A. Yes, because I'm able to use
7 that approach to exploit the cross-sectional
8 variation to capture those effects reliably,
9 whereas because they change so little on the
10 aggregate year over year, it would be very
11 hard if not impossible to do that in the time
12 series.

13 Nonetheless, using trends in
14 those underlying demographic, socioeconomic
15 and healthcare variables, I find that there's
16 very little of the growth in opioids that's
17 associated with those factors.

18 Q. Did you attempt to run your
19 direct regression with demographic,
20 socioeconomic, and healthcare factors as
21 variables?

22 MR. SOBOL: Objection.

23 A. I did not, no.

24 BY MR. ROTH:

25 Q. And why not?

1 THE WITNESS: Bless you.

2 MR. SOBOL: For the sneeze, not
3 the question.

4 THE WITNESS: Yes.

5 A. For the question, those -- at
6 the national level, as you know in my model,
7 those variables show very little variation
8 over time. If one were to try to put them in
9 a model, they would predict very little of
10 the sales. And you can see from the
11 literature that we've reviewed today, none of
12 these studies enter variables such as these.

13 BY MR. ROTH:

14 Q. All right. If we can go back
15 to the G?n?l study, Exhibit 10. Did we not
16 use that one yet? We did, I think, yeah.

17 A. No, I don't remember looking at
18 it.

19 Q. Yeah, it's Exhibit 10. We
20 looked at it quickly.

21 A. I'm afraid mine are out of
22 order.

23 MR. SOBOL: This one here.

24 THE WITNESS: Thank you. It's
25 just probably at the bottom. Thank

1 you.

2 BY MR. ROTH:

3 Q. Page 80.

4 A. Yes.

5 Q. So bear with me. You know
6 what, let's do this. Let's first go to the
7 Mizik and Jacobson study.

8 A. Okay.

9 Q. Which is Exhibit 9.

10 A. And what page would you like me
11 to look at?

12 Q. 1707.

13 A. Okay.

14 Q. And actually it starts on 1706,
15 so I'm sorry about that.

16 A. Okay. That's fine.

17 Q. So they're talking about the
18 G?n?l study. Do you see that at the bottom
19 of the right column?

20 A. Yes, I see that -- sort of
21 right midway down the page, they start
22 talking about it.

23 Q. Yeah. And they say at the
24 bottom of the page -- well, yeah. So midway
25 down the page they say they use data

1 involving 1,785 patient visits to estimate a
2 multinomial logit model assessing factors
3 influencing physician prescribing behavior.

4 Do you see that?

5 A. I do.

6 Q. And then the next paragraph
7 says: A concern, which G?n?l et al
8 explicitly acknowledge, is over the role of
9 physician-specific effects that can induce a
10 bias in the estimated coefficients. They
11 state "prescription behavior patterns might
12 be strongly influenced by factors other than
13 the explanatory variables we include in our
14 model. Examples are physicians' unobservable
15 personal characteristics. Ignoring these
16 factors might bias the coefficients of the
17 included explanatory variables."

18 Do you see that?

19 A. Yes. This is the subject that
20 we've been discussing a great deal this
21 afternoon about these -- it's the same as the
22 endogeneity concern, which is fundamentally
23 about an omitted variable at the physician
24 level. So the concern is about
25 cross-sectional variation, not about time

1 series variation.

2 Q. Okay.

3 (Whereupon, Deposition Exhibit
4 Rosenthal-17, 2007 Steinman et al
5 Publication, was marked for
6 identification.)

7 BY MR. ROTH:

8 Q. And then let me mark as
9 Exhibit 17 the Steinman study,
10 Characteristics and Impact of Drug Detailing
11 for Gabapentin.

12 Do you have that document in
13 front of you?

14 A. I do.

15 Q. And is this a document you
16 reviewed and quoted and relied upon in your
17 report?

18 A. It is.

19 Q. So it looks like from the cover
20 page, for this study this evaluated off-label
21 promotions for gabapentin by analyzing forms
22 on specific detail visits to specific doctors
23 between 1995 and 1999.

24 Do you see that?

25 A. Yes, I do.

1 Q. And at page 748, in the right
2 paragraph -- I'll wait until you get there.

3 A. 748, right paragraph.

4 Q. Do you see "Our study has
5 several limitations"?

6 A. Yes.

7 Q. And in that paragraph, they
8 say: Third, the self-reported intention to
9 increase future prescribing or recommending
10 of gabapentin might have been affected by
11 factors other than the detail. Thus, we
12 cannot prove a causal relationship between
13 the detail and self-reported behavior change.
14 Do you see that?

15 A. Yes. Again, this is a
16 cross-sectional analysis.

17 Q. And is it your testimony that
18 no aggregate time series regressions ever run
19 instrumental variable tests to account for
20 endogeneity?

21 A. No, that was not my testimony.
22 It depends a little bit on what you mean by
23 aggregate. The analyses that I know of,
24 including my own, that have used instrumental
25 variables have been product-level analyses.

1 Even though the Kaiser Family Foundation
2 report we looked at does some class-level
3 analysis, all the instrumental variables are
4 at the product level.

5 Q. Got it.

6 A. I can't say for sure that
7 there's no model that aggregates above that
8 level that uses instrumental variables. I
9 haven't seen one, but...

10 Q. So you raise a good point. I
11 mean, all of the peer-reviewed published
12 studies we've looked at today have related to
13 cross-sectional drug-specific models of
14 marketing.

15 A. The panel, so some of them have
16 time series. This one doesn't have any time
17 series variation, but some of them have both
18 cross-sectional and time series variation,
19 but they all at least have some product level
20 variation in them.

21 Q. And as we talked about, your
22 model does not do that?

23 A. My assignment --

24 MR. SOBOL: Objection, asked
25 and answered.

1 A. -- is about an aggregate
2 phenomenon, which I appropriately
3 characterize with an aggregate model.

4 BY MR. ROTH:

5 Q. Okay. In your direct model,
6 did you consider adding a variable for lagged
7 sales?

8 A. I did not.

9 Q. Did you consider adding a
10 variable in your aggregate model for
11 nonmarketing misconduct?

12 A. Well, I did add those event
13 variables that I considered to be associated
14 with nonmarketing misconduct.

15 Q. That's a good clarification.
16 Beyond the five events in Model C, there's no
17 variable for nonmarketing misconduct in your
18 direct model?

19 A. There is not, no.

20 Q. And just to confirm, Model C is
21 the same as Model B with the addition of the
22 five events?

23 A. That's correct.

24 Q. Did you consider adding a
25 variable to your direct model for illegal

1 prescribing?

2 A. I'm sorry, can you explain
3 what -- what that would look like?

4 Q. You're the economist. You
5 probably have a better idea of how to put
6 that into a study. But is that something you
7 considered doing?

8 A. What is --

9 MR. SOBOL: Objection to the
10 form.

11 You're the lawyer. What's
12 illegal?

13 THE WITNESS: Yes, sorry,
14 that's my question.

15 MR. ROTH: I asked both of you.

16 A. Well, as I understand this
17 case, it is not about illegal prescribing but
18 illegal promotion, and those are two
19 different things.

20 BY MR. ROTH:

21 Q. Right. But you understand that
22 there are doctors who have been criminally
23 convicted for illegally prescribing opioid
24 products?

25 A. I -- yes, I do know there have

1 been some prosecutions.

2 Q. And you don't have any variable
3 in your model to account for that?

4 A. I do not account for that in my
5 model, no.

6 Q. You don't have any variable in
7 your model to account for diversion of
8 lawfully prescribed drugs to someone other
9 than the intended user?

10 MR. SOBOL: Objection to the
11 form.

12 A. Just to be clear, when -- when
13 thinking about what to put in a model, one
14 reason we might do it is we want to say this
15 is something separate from the variable of
16 interest.

17 But if, in fact, the allegedly
18 unlawful marketing caused diversion, then it
19 would not be appropriate to pull it out from
20 the model.

21 BY MR. ROTH:

22 Q. Right. But you could conceive
23 of a set of facts where diversion occurs in
24 the setting of perfectly lawful marketing and
25 prescribing?

1 A. Well, my model is currently
2 agnostic as to whether the prescriptions
3 caused by the unlawful conduct were diverted
4 or not. It seems to me that it's a legal
5 question about, you know, whether it would be
6 appropriate to separately identify those.

7 As we started out our
8 conversation today, it makes sense to me as
9 an economist that what -- whatever happened
10 with those prescriptions after they left the
11 pharmacy, the fact that they generated
12 profits for the defendants is a reasonable
13 basis for recovery, again, on the notion that
14 recovery is intended to deter this kind of
15 conduct in the future.

16 Q. Does your direct model have any
17 variable for formulary placement status?

18 A. It does not.

19 Q. Your direct model does not have
20 any variable for prescription drug coverage?

21 A. As we discussed earlier, these
22 are not factors that I would expect to be
23 changing over time in a way that would
24 predict the sales of opiates as a class, so
25 if there are formulary changes, that may

1 result in more generics, more of the
2 preferred brand versus the nonpreferred
3 brand. I don't believe that those are
4 appropriately captured in a model like this.

5 Q. Okay. Why do you prefer
6 Model B to Model C?

7 A. In part, because of that
8 counterintuitive effect that we talked about
9 before, with -- now I can't remember if it
10 was oxycodone or hydrocodone.

11 Q. I think it was the hydrocodone
12 rescheduling.

13 A. I think it was hydrocodone,
14 yes.

15 So that suggests to me that
16 that's -- whatever it's doing, it's not
17 picking up what I think it's supposed to be
18 doing.

19 It makes almost no difference
20 in the predictions, we looked at those
21 charts before, and you can see in the
22 adjusted R-squared there's almost no
23 difference, but it's -- to me it looks
24 like it's not the right way to capture
25 the effect of these events.

1 BY MR. ROTH:

2 Q. And, actually, I think Model C
3 has a slightly higher adjusted R-squared than
4 Model B.

5 A. Yeah, just to be clear, it's
6 one ten-thousandth of a point.

7 Q. But it is higher.

8 A. It is technically higher.

9 Q. If you were to put more of the
10 events from Figure 5 into what is Model C,
11 would that not be a fairly robust test of the
12 predictiveness of Model B since Model C is
13 really just Model B with the events added?

14 A. I guess I don't understand your
15 question. If I were to put more events in
16 Model C, would that be another test of
17 Model B?

18 Q. Right.

19 A. I think the fact that -- that
20 adding a subset of events that were, you
21 know, displaced over time doesn't change
22 ultimately the predictions in Model B,
23 suggests to me that it's not going to be
24 worthwhile.

25 And again, the counterintuitive

1 coefficient on the hydrocodone rescheduling
2 suggest to me also, as we continue to add
3 more events, we'll get a certain amount of
4 gobbledygook. I mean, that's just going to
5 be true in a time series model.

6 In any econometric model, the
7 goal is to include the important factors but
8 be as parsimonious as possible. Adding all
9 these events would not be parsimonious.

10 Q. I think I heard you a minute
11 ago say that you rejected Model C in favor of
12 Model B in part because of the hydrocodone
13 rescheduling. Is there anything else that
14 led you to make the decision that Model B was
15 preferred?

16 A. It adds almost nothing.

17 Q. So it's really a function of
18 almost essentially the same R-squared and you
19 get this wonky result with hydrocodone's
20 rescheduling that leads you to prefer
21 Model B?

22 MR. SOBOL: Objection, asked
23 and answered.

24 A. That's -- yes, that is in
25 effect correct. I look at the two models, I

1 see that they give almost the same
2 predictions, the same actual predicted and
3 but-for predicted, and it seems to me that
4 Model C is not well specified in those five
5 events, that they don't seem to work in the
6 way that they're specified there, which is
7 that they start happening at a point in time.

8 BY MR. ROTH:

9 Q. And yet, your breaks also occur
10 at a point in time?

11 MR. SOBOL: Objection.

12 A. The breaks are doing something
13 entirely different because they're
14 interacting with promotion. They're saying,
15 you know, we've estimated this underlying
16 effectiveness of promotion and does that
17 relationship shift at a point in time.

18 BY MR. ROTH:

19 Q. Okay. Model B suggests an
20 R-squared of 99.36%.

21 A. Yes.

22 Q. So your model explains more
23 than 99% of the variation in MMEs with
24 promotion?

25 A. That's correct, and price.

1 Q. So less than 1% of opioid MMEs
2 are explained by anything but price and
3 promotion?

4 A. That's correct.

5 Q. And you conclude that the
6 predictive power of Model B is shown to be
7 quite good?

8 A. Yes.

9 Q. Have you tried running your
10 model removing promotion and just having
11 price in the model?

12 A. I have not.

13 Q. If it showed negative MMEs,
14 what would that mean for your model?

15 A. If we're removing promotion
16 and -- I mean, I guess as we talked about in
17 looking at Model A, it would suggest that
18 there was something that's missing from the
19 model. When we looked at the but-for MMEs as
20 negative, that clearly it is not doing a good
21 job of predicting the real world in which
22 there were positive MMEs.

23 Q. What is overfitting?

24 A. Overfitting is when you include
25 factors in the model such that you perfectly

1 predict the dependent variable, that you've
2 saturated the model, which is why I don't add
3 more events to this model, where it's already
4 high. Having an adjusted R-squared as high
5 as we do in this case in a time series model
6 is quite common.

7 Q. How do you tell to see if a
8 model is overfit?

9 A. I don't actually, as I sit
10 here, recall the specific test for
11 overfitting, but usually it's about
12 predicting out of sample and looking at how
13 well the model forecasts.

14 Q. How does the R-squared of your
15 model in this case compare to R-squareds you
16 have from other models you've done of
17 promotion against sales?

18 A. I don't recall specifically,
19 but I think we probably have a few in front
20 of us that we could look at.

21 Q. Yeah. I mean, does 99.36
22 strike you as one of the higher R-squareds
23 you've had or are all of your models perfect
24 in their predictions --

25 A. Model A has an R-squared of

1 88 -- well, 87.99, the adjusted R-squared.
2 So we have a range here. Again, time series
3 models do typically have very high
4 R-squareds. I don't know what they've been
5 in other models.

6 As we talked about before, this
7 is unlike the model, for example, that we did
8 in the Kaiser Family Foundation report where
9 we're looking at a couple of years for about
10 25 drugs and exploiting both time series and
11 cross-sectional variation.

12 Q. You understand from the
13 literature that a very high R-squared in the
14 presence of substantial unmodeled
15 autocorrelation can be an issue?

16 A. I think we've already talked
17 about the error structure here, and my
18 understanding is that my team looked at that
19 early on and concluded that it was not a
20 problem here.

21 Q. Who from your team did that
22 work?

23 A. That would be Forrest McCluer.

24 Q. And what specifically did
25 Mr. McCluer do to test for autocorrelation?

1 A. Well, as we were talking
2 before, he was looking at the correlation
3 over time of the errors in the model.

4 Q. And did you see the results of
5 his work?

6 A. I did not see the results
7 specifically, no.

8 Q. Is your direct model a linear
9 model or a nonlinear model?

10 A. Well, it's nonlinear because of
11 the depreciation rate. It is effectively run
12 using ordinary linear -- ordinary least
13 squares, but it's nonlinear because of the
14 interaction of the depreciation rate.

15 Q. Is R-squared an appropriate
16 measure for nonlinear models in econometrics?

17 A. The adjusted R-squared that we
18 report here is appropriate for this model.

19 Q. Okay. Let me mark as
20 Exhibit 18 an article from Spiess and
21 Neumeyer, An evaluation of R-squared as an
22 inadequate measure for nonlinear models in
23 pharmacological and biochemical research.

24 (Whereupon, Deposition Exhibit
25 Rosenthal-18, 2010 Spiess and Neumeyer

1 Publication, was marked for
2 identification.)

3 BY MR. ROTH:

4 Q. Do you see that?

5 A. I do.

6 Q. The title sounds pretty
7 relevant.

8 Were you aware of this paper?

9 A. Not specifically.

10 Q. Okay. So this is a 2010 paper
11 in BMC Pharmacology. It looks like Spiess
12 and -- is from the Department of Andrology at
13 the University Hospital Hamburg-Eppendorf in
14 Germany.

15 Do you see that?

16 A. I don't actually see where the
17 authors --

18 Q. I'm looking at the footnote.

19 A. Uh-huh, yeah.

20 Q. Okay. So at page 1, at the
21 very bottom of the first column under
22 Background, it says: Although it is known
23 now for some time that R-squared is an
24 inadequate measure for nonlinear regression,
25 many scientifics and also reviewers insist on

1 it being supplied in papers dealing with
2 nonlinear data analysis.

3 Do you see that?

4 A. Yes.

5 Q. And then if you flip to page 8,
6 under their plotted diagrams in Figure 3, I'm
7 in the left column.

8 A. Left column, and the notes
9 under --

10 Q. Under the chart.

11 A. Yep.

12 Q. The end of the first paragraph
13 says: Consequently, and based on the
14 analysis of a sigmoidal nonlinear setup as
15 described here, we feel compelled to give the
16 following summary: 1, The use of highly
17 inferior nonlinear models is reflected only
18 in the third or fourth decimal place of
19 R-squared, and thus the description of single
20 models when using R-squared is not
21 meaningful, as this measure tends to be
22 uniformly high when a set of models is
23 inspected.

24 Do you see that?

25 A. I do.

1 Q. And the authors say: This has
2 also been noted by others, and they have a
3 note 20.

4 Do you see that? And there's a
5 Zeng study from 2008 that they cite?

6 A. Yes.

7 Q. And are you familiar with that
8 study?

9 A. No, I'm not familiar with that
10 study. Ultimately, the -- whether you rely
11 on the R-squared statistic or not, and I -- I
12 don't know honestly if this applies to the
13 particular nonlinear model that I'm using.
14 These are obviously full-time statisticians.

15 But in my experience, the
16 adjusted R-squared is very frequently used
17 for these kinds of models, but ultimately,
18 you looked at the data; you can see the
19 predictions versus the underlying data, and
20 we have a very good sense of how well the
21 model actually fits the data.

22 Q. And what measure do you have of
23 how well the model fits the data other than
24 the R-squared statistic?

25 A. I imagine, so they are talking

1 about using other criterion, the AIC and
2 other criteria, that those model criteria,
3 AIC and BIC, which are other model criteria
4 that are frequently output by these kinds of
5 programs. I imagine that they would likely
6 agree.

7 I can't say for sure. I
8 haven't calculated them or looked at them
9 myself, but I think the fact that they
10 believe the R-squared statistic itself is not
11 meaningful does not suggest that there's no
12 information from the model fit data that I've
13 looked at.

14 Q. And there's no AIC or BIC
15 statistic in your report.

16 A. I don't think it's in the
17 output, no. It wasn't in what we looked at,
18 was it?

19 Q. No. I just looked at the
20 tables and didn't see it.

21 A. Yeah.

22 Q. Okay. Turning to Table 2 of
23 your report, which is on page 51.

24 A. Yes.

25 Q. So this table is your

1 calculation of MMEs attributable to
2 defendants' promotion from Model B; is that
3 right?

4 A. That's correct.

5 Q. And so between 1995 and 2018,
6 you calculate a percentage of MMEs that were
7 attributed to defendants' promotion in each
8 year, right?

9 A. I do.

10 Q. And it starts with only [REDACTED] in
11 1995.

12 Do you see that?

13 A. Yes.

14 MR. SOBOL: Objection to form.

15 A. Yes, the number is [REDACTED] in
16 1995.

17 BY MR. ROTH:

18 Q. And then it increases
19 consistently, with the exception, I think, of
20 2005 and 2006 in every year after that.

21 A. That is correct.

22 Q. And in 2005-2006, for the
23 record, it's [REDACTED], so it stays
24 relatively flat in those years.

25 A. Yes, that's correct.

1 Q. So despite the volume of MMEs
2 going down, your model reflects that the MMEs
3 attributable to defendants' promotion
4 increases over time?

5 A. Just to be clear, what this is
6 saying is the share of MMEs, and so that
7 makes perfect sense, that as the volume is
8 going down over time, that the share could
9 well be increasing.

10 Q. To what do you attribute the
11 increasing percentage attributable to
12 defendants' promotion over time?

13 MR. SOBOL: Objection.

14 A. I think it would make sense to
15 interpret that. Of course, it is the result
16 of the analysis, but if we think about the
17 notion that defendants' detailing and other
18 conduct cumulatively affected prescribing
19 patterns, that would suggest that it would be
20 increasing.

21 BY MR. ROTH:

22 Q. It's the depreciation rate
23 that's driving it up, in part?

24 MR. SOBOL: Objection, form.

25 A. No, it's the model results that

1 are driving it up. Again, the fact that the
2 stock of promotion is increasing because of
3 the negative depreciation rate in Model B
4 doesn't mean necessarily that the effect has
5 to be increasing in that first part of -- of
6 before we allow the promotional effectiveness
7 to deteriorate. That would be true because
8 there's a positive coefficient on promotion,
9 and so it's simply true over time that that
10 promotion is having a larger and larger
11 effect.

12 BY MR. ROTH:

13 Q. Have you run Model B with the
14 same period interval breaks with a positive
15 depreciation rate to see how that would
16 affect things?

17 MR. SOBOL: Objection, asked
18 and answered.

19 A. I believe you asked me that
20 earlier, and I said no.

21 BY MR. ROTH:

22 Q. I asked a lot of questions. I
23 can't remember all of them. I'm sorry.

24 Let's turn to paragraph 76 of
25 your report, and I want to talk about your

1 sensitivity with respect to specific
2 defendants.

3 A. Okay.

4 Q. You started talking about this
5 this morning, this is Attachment C.

6 A. That's right.

7 Q. And eventually it outputs into
8 Table 3, which is on the page.

9 A. Yes.

10 Q. So in paragraph 76, you say:
11 As noted in my assignment, I have examined
12 the sensitivity of my calculations of impact
13 to the inclusion or exclusion of
14 particularly -- start over. Strike that.

15 As noted in my assignment, I
16 have examined the sensitivity of my
17 calculations of impact to the inclusion or
18 exclusion of particular defendants'
19 promotional efforts in the construction of my
20 but-for scenario.

21 Do you say that in
22 paragraph 76?

23 A. I do.

24 Q. And then you say: In the first
25 row of Table 3, I show that impact of

1 manufacturer misconduct on MMEs from 1995 to
2 2018 with a but-for scenario that assumes
3 none of the defendants' marketing was lawful.

4 Do you see that?

5 A. I do. I was just thinking,
6 because this is in the errata, if we talk
7 about specific numbers, can we remember to
8 bring that up?

9 Q. I was going to go there next.
10 So you actually --

11 A. Okay. I was trying to find it.

12 Q. You gave us the errata on
13 Thursday.

14 A. Yes.

15 Q. One of your errata was actually
16 saying that something you previously said was
17 not statistically significant is
18 statistically significant.

19 A. That's right.

20 Q. And another errata is changing
21 the percentages in Table 3.

22 A. Yes.

23 Q. Those are fairly immaterial
24 errata.

25 MR. SOBOL: Objection.

1 A. I would disagree, although I
2 don't want to use the word "material" because
3 that may mean something different to you and
4 to me, but the first one relates to the joint
5 significance of those five events.

6 It doesn't change my opinion
7 about the counterintuitive effect of that
8 hydrocodone event and my general sense that
9 they're not picking up something in the data
10 that's important because they don't really
11 change the results.

12 So that doesn't change my
13 opinion, so that doesn't change my
14 conclusions.

15 This was a miscalculation.
16 Table 3 was inadvertently calculated
17 including 1993 and 1994 in which the actual
18 and but-for worlds are exactly the same, and
19 so those zeros basically were averaged in
20 there.

21 So the underlying data, they're
22 exactly the same as they were originally
23 submitted, it's just the Table 3 summary is
24 updated.

25 ///

1 BY MR. ROTH:

2 Q. And when you updated the
3 Table 3 summary, the defendants' share in
4 your model actually increased?

5 A. Yes, again, because it takes
6 those two years that are not in question out
7 of the analysis.

8 Q. Why were those two years in
9 there to begin with? Had you modeled it
10 going back to '93 instead of '95?

11 A. In all of our models we go back
12 to '93. As I mentioned earlier, to estimate
13 the model as accurately as possible, we used
14 all the data that we could, and so again, we
15 allow for -- we look at the promotion that
16 was happening before the alleged misconduct.

17 Q. And you decided to estimate the
18 harms from '95 forward at the instruction of
19 counsel, correct?

20 A. That's because I understand, as
21 we talked about, again, earlier this morning,
22 that counsel intend to prove that the
23 misconduct began in 1995.

24 Q. Okay. So the difference
25 between each manufacturer's percentage in

1 Table 3 and the baseline is the percent of
2 MMEs you attribute to that manufacturer; is
3 that right?

4 A. To their promotion.

5 Q. And let's just take a step
6 back.

7 How was that done? How did you
8 attribute promotion to a particular
9 manufacturer defendant?

10 A. So in the IMS data, we can see
11 who's promoting for what product, so that's
12 the sort of complex nature of the tables in
13 the back. So we can see when, for example,
14 there were other manufacturers promoting for
15 one of the defendants, and we can make those
16 cross-walks.

17 Q. And the IMS data doesn't always
18 consistently put drugs in the same
19 manufacturer's bucket; is that right?

20 MR. SOBOL: Objection.

21 A. I'm not sure what you mean by
22 that. Would you explain?

23 BY MR. ROTH:

24 Q. We can look at something that
25 explains it.

1 A. Sure.

2 Q. But so I understand
3 mechanically how Table 3 works, the baseline
4 is when you take all MMEs that you claim are
5 attributable to defendants collectively.
6 That's the baseline?

7 A. Yes. So that was where I
8 realized that there was a mistake in the
9 table is that that baseline number is the
10 same as the summary number in Table 2.

11 Q. So it's [REDACTED]

12 A. That's correct.

13 Q. Okay. And then each line item
14 is essentially calculating the baseline
15 percentage against the percent that you
16 attribute to that specific manufacturer?

17 MR. SOBOL: Objection.

18 A. I'm not sure, but you may be
19 right, but I wouldn't have said it that way.

20 BY MR. ROTH:

21 Q. How would you say it? Just
22 explain what each line is.

23 A. Each line item has a particular
24 defendant named in it, and in the number
25 calculated to the right of that, I rerun the

1 but-for scenario, but I allow that defendant
2 their promotion to stay in the but-for world,
3 so that's by way of saying, no, that things
4 would not have been different for this
5 defendant. That is exactly -- it was
6 appropriate. It was not -- not shown to be
7 unlawful, whatever.

8 Q. Right. So you assumed that a
9 particular defendant's promotion is lawful,
10 and then rerun your but-for world?

11 MR. SOBOL: Objection.

12 A. That is certainly the way I
13 framed it, but presumed that for whatever
14 reason, we are not going to recover related
15 to that promotion, and so it stays in the
16 but-for world instead of being backed out
17 like the others.

18 BY MR. ROTH:

19 Q. So in order to allocate MMEs
20 among the individual defendants and
21 non-defendants, you said you looked at IMS
22 data. Can you be more specific about which
23 specific IMS data? Was it the NPA data or
24 the IPS data or both?

25 A. I -- I don't think I said what

1 you said I said. But just to be clear, for
2 this analysis, what we're backing out is
3 promotion, detailing, not MMEs. We're
4 backing out the detailing, and then whatever
5 MMEs flow from that, that comes out in the
6 analysis.

7 Q. Okay. So what is the data
8 source for the detailing?

9 A. The Integrated Promotional
10 Services.

11 Q. So the IPS?

12 A. The IPS.

13 Q. So you did not consider the NPA
14 for that allocation?

15 A. No, because that was not the
16 purpose of the analysis. The purpose of the
17 analysis was to change what we're considering
18 to be the challenged conduct, and then the
19 model tells us how many MMEs flowed from
20 that.

21 Q. Did anyone check whether the
22 IPS data was corroborated by the NPA data
23 with respect to how it allocated drugs?

24 MR. SOBOL: Objection.

25 A. Well, I think that notion

1 doesn't make a lot of sense. There are drugs
2 that are sold and not promoted. So
3 there's -- there's not a one-to-one
4 relationship.

5 BY MR. ROTH:

6 Q. Even though 99.6% of the world
7 is explained by promotion and price, drugs
8 get sold without being promoted?

9 MR. SOBOL: Objection.

10 A. Those two things are not at all
11 in contradiction. Again, remember, we're
12 looking at an aggregate market here and we're
13 talking about the aggregate market growth.
14 And so there are explicitly spillover effects
15 anticipated here.

16 BY MR. ROTH:

17 Q. Are you aware of for which
18 drugs specifically plaintiffs have alleged
19 unlawful marketing?

20 A. Yes. I mean, could I sit here
21 and rattle them off? No. They're -- but I'm
22 happy to go through Table C with you.

23 Q. Well, let me ask you that.

24 Did you go through every drug
25 on Table C to make sure that there was an

1 allegation that with respect to that drug,
2 something unlawful occurred?

3 MR. SOBOL: Objection.

4 A. I received my instructions from
5 counsel about what promotion to consider
6 unlawful, and that was designated by
7 defendant rather than by drug. And so I
8 confirmed with counsel all of the lists in
9 Table C. So that's my understanding, that
10 these are the correct -- the correct drugs
11 and defendants to be including in my
12 analysis.

13 BY MR. ROTH:

14 Q. So there could be drugs on
15 Table C for which counsel will present no
16 evidence of unlawful marketing?

17 MR. SOBOL: Objection.

18 A. I guess I don't know one way or
19 the other.

20 BY MR. ROTH:

21 Q. If it were the case that there
22 are drugs on Table C for which no evidence of
23 unlawful marketing is presented, you would
24 agree that you should then shift that drug to
25 the but-for side of the equation?

1 MR. SOBOL: Objection.

2 A. Well, I'm not a lawyer, so I
3 really don't -- I don't know how that
4 liability will work, if it's drug by drug or
5 defendant by defendant. I do not honestly
6 know.

7 As we talked about before and
8 as you can see here, I have the ability to
9 back out drugs as well as defendants, but
10 I -- I haven't anticipated that.

11 BY MR. ROTH:

12 Q. Okay. And I think we spoke
13 about this a little earlier, but you know
14 there's a difference between Schedule II and
15 Schedule III drugs under the Controlled
16 Substances Act?

17 A. I do.

18 Q. And you are aware that the DEA
19 has changed the classification of certain
20 drugs over time because we'd talked about, I
21 think, hydrocodone?

22 A. Yes. Yes, I'm aware of that.

23 Q. And I think you said this, but
24 just to confirm, you didn't consider that
25 issue in determining how to allocate

1 detailing contacts for drugs that later
2 became Schedule II but previously were
3 Schedule III at the time of detailing?

4 A. Well, I would say I did
5 consider it, and in consultation with
6 counsel, I left -- I treated those drugs as
7 if they were Schedule II for the entire time
8 period. That was an explicit assumption.

9 Q. Okay. And what was that
10 assumption based on?

11 A. Instruction from counsel.

12 Q. Are you aware that Dr. Perri
13 opines on specific promotional efforts
14 employed by the manufacturer defendants that
15 he claims were unlawful?

16 A. I have read Dr. Perri's report.
17 I'm aware that he opines on some specific
18 kinds of activities, yes.

19 Q. Have you read Dr. Egilman's
20 report?

21 A. I have not.

22 MR. SOBOL: Who has?

23 BY MR. ROTH:

24 Q. Who prepared the tables in
25 Appendix C that assigned the particular drugs

1 to particular defendants?

2 A. Forrest McCluer.

3 Q. Do you know how he determined
4 in the first instance who was a defendant and
5 who was a non-defendant?

6 A. In consultation with counsel.

7 Q. Based on instruction from
8 counsel?

9 A. I guess that's right. I mean,
10 certainly it wasn't his opinion about who was
11 a defendant. There were some questions
12 related to changes in ownership that required
13 some digging, and Forrest may have
14 contributed to the conversation, but
15 ultimately, counsel determined who was a
16 defendant and a non-defendant.

17 Q. Were you involved in those
18 decisions?

19 A. Not explicitly, no.

20 Q. How did Mr. McCluer conclude
21 whether an entity that is not a named
22 defendant in the lawsuit was affiliated with
23 a defendant for the purposes of your report?

24 A. In this conversation with
25 counsel, he asked counsel to instruct.

1 Q. How did you allocate
2 prescriptions among the named defendants once
3 those defendants were established? Was it
4 based on the IPS data? We're mixing things,
5 so let me back up a step.

6 A. Yes.

7 MR. SOBOL: Yeah, you are.

8 BY MR. ROTH:

9 Q. Did you allocate prescriptions
10 among the named defendants, or is it your
11 testimony your model only allocates the
12 detailing contacts among the named
13 defendants?

14 MR. SOBOL: Objection. You
15 mean promotions, I think.

16 MR. ROTH: Detailing and
17 promotion are the same thing in her
18 report. But let me reask the question
19 so we have a clean record.

20 MR. SOBOL: Sorry.

21 BY MR. ROTH:

22 Q. Did you allocate prescriptions
23 among the named defendants or does your model
24 only allocate the detailing contacts among
25 the named defendants?

1 A. Well, if you look at Table C.2,
2 I do characterize by defendant and by drug,
3 MMEs and extended units. So I don't know
4 exactly what you mean by allocate. Because
5 my model is aggregate, I don't have to
6 allocate MMEs. I am summing up detailing for
7 the defendants versus non-defendants, but
8 these tables summarize the data from the NPA
9 which give you extended units, which we then
10 convert to MMEs.

11 Q. Okay. So I misunderstood you
12 before.

13 A. Yeah.

14 Q. You allocated the detailing
15 contacts using the IPS data, but then you did
16 take from the NPA data the extended units and
17 the MMEs for the drugs?

18 MR. SOBOL: Objection.

19 A. Yes. I'm sorry if you were
20 confused about that. The NPA is the sales
21 data, the left-hand side variable. The IPS
22 is the promotional data, the right-hand side
23 variable.

24 BY MR. ROTH:

25 Q. Okay. So for the sales data

1 for the MMEs, are you saying you didn't have
2 to allocate because you just put the same
3 MMEs for the whole class in every line, or
4 how -- how do the MMEs, for example, for
5 Abstral, the first drug on the list, compare
6 to the MMEs for other products in that class?

7 A. Well, you can see right here --
8 I've lost the first page, but to the right --
9 if you wanted to go to the beginning, to
10 Table C.1, which is a little bit easier to
11 read.

12 Q. I'm there.

13 A. You can see MMEs and extended
14 units for Abstral.

15 Q. So this is just taken straight
16 from the data. This is the way the NPA data
17 is, it's by drug and it contains the MMEs and
18 the prescriptions?

19 MR. SOBOL: Objection.

20 A. No. The NPA data contain the
21 extended units and prescriptions. The MMEs
22 are calculated using the multipliers we
23 talked about from the CDC.

24 BY MR. ROTH:

25 Q. Got it. That's a good

1 clarification.

2 So the NPA contains the
3 extended units by drug?

4 A. Yes. I believe it's actually
5 by NDC, and we rolled them up to drug.

6 Q. Okay. And you rolled them up
7 to drug. Then in C.2 you associate the drugs
8 with defendant or non-defendant?

9 A. I do.

10 Q. So how was that determination
11 made?

12 A. In consultation with counsel
13 and in the IMS data, so the IMS data
14 automatically say who the manufacturer is,
15 but the IMS data have no memory, so if
16 Actavis bought a company yesterday, it's
17 considered an Actavis drug going back in
18 time.

19 And so considerable work was
20 undertaken to examine the -- as we might call
21 it, the genealogy of these drugs.

22 Q. And who undertook the work to
23 examine the genealogy of the drugs?

24 A. Well, Forrest provided the data
25 that we have, as I mentioned earlier, and

1 worked with counsel.

2 Q. And what did you do to verify
3 that Mr. McCluer and counsel's allocation of
4 the genealogy of the drugs was construct?

5 A. I understand the process they
6 went through, for example, using public
7 documents about acquisitions. I did not
8 independently verify those allocations.

9 Q. Okay. We'll do a couple with
10 public documents and see how you do.

11 A. Okay. Good.

12 Q. Hopefully you had them do a
13 sample or two for you, no?

14 A. I certainly looked at what
15 their process was. There are a lot of moving
16 parts.

17 (Whereupon, Deposition Exhibit
18 Rosenthal-19, Kadian
19 Defendant/Non-Defendant Spreadsheet,
20 was marked for identification.)

21 BY MR. ROTH:

22 Q. Okay. So I want to hand you
23 what I'll mark as Exhibit 19, which I will
24 represent to you is your backup data
25 distilled down for the drug Kadian.

1 A. Excellent.

2 Q. And do you recognize this data
3 or Excel format or did you not review these
4 sorts of documents with the team?

5 A. Well, I recognize the general
6 structure of this file. I couldn't tell you
7 one way or another if I've seen this exact
8 file.

9 Q. Okay. So there's a column that
10 says def_status. Do you see that?

11 A. I do.

12 Q. And it says Non or Def.

13 A. Yep.

14 Q. And we can presume what that
15 means, but have you --

16 A. It means non-defendant or
17 defendant.

18 Q. And are you speculating as to
19 that or did Forrest tell you that? I mean,
20 how do you know that?

21 A. Again --

22 MR. SOBOL: Objection. Just no
23 communications with counsel.

24 But go ahead.

25 A. Again, I've -- I know Forrest's

1 language around this.

2 BY MR. ROTH:

3 Q. Okay. And then there's a
4 column for drug.

5 Do you see that?

6 A. Yes.

7 Q. And then a second column for
8 defendant, but this one will say either
9 non-defendant or it looks like a company
10 name.

11 Do you see that?

12 A. Yes.

13 Q. Then there's a column for
14 marketer. Do you see that?

15 A. Yes.

16 Q. And do you know what that is?

17 A. Yes. As I noted earlier this
18 morning, I'm aware that there are marketing
19 arrangements whereby a third party may market
20 for a particular drug, as AbbVie did for
21 Purdue in the case of OxyContin.

22 Q. And then the last columns say
23 date, def_contacts and def_cost_of_contacts.

24 Do you see that?

25 A. Yes. Those are directly from

1 the IPS.

2 Q. And what are those columns,
3 def_contacts and def_cost_of_contacts
4 representing?

5 A. The date is the month. It says
6 1 January, but it is the month of January.
7 Def_contacts is the number of contacts, and
8 then cost_of_contacts is a dollar value that
9 IMS assigns to it.

10 BY MR. ROTH:

11 Q. So you had dollar values in the
12 IPS data but you chose not to model that?

13 A. That's correct.

14 Q. So if you look at the
15 def_contacts, is this just taken directly
16 from the IPS data without any modification by
17 Mr. McCluer?

18 A. That's correct.

19 Q. How do you know that?

20 A. Well, you put a piece of paper
21 in front of me, I can't a hundred percent
22 guarantee it, but it's my belief that these
23 are exactly the form that the data come from
24 the IPS, so I believe that they are
25 unmodified.

1 Q. Sticking with this sheet for
2 Kadian, the first couple of entries are
3 labeled non-defendant.

4 Do you see that?

5 A. Yes.

6 Q. And Alpharma and Faulding are
7 both listed as non-defendant.

8 Do you see that?

9 A. Yes.

10 Q. And then if you go about seven
11 lines down, do you see there's a marketer
12 labeled Purepac.

13 Do you see that?

14 A. Yes.

15 Q. And that's affiliated with
16 defendant Actavis.

17 Do you see that?

18 A. I do.

19 Q. Any idea why Purepac was
20 assigned to Actavis by Mr. McCluer?

21 A. Again, I was not involved in
22 the individual decisions, so I do not know.

23 (Whereupon, Deposition Exhibit
24 Rosenthal-20, Alpharma Form 8-K, was
25 marked for identification.)

1 BY MR. ROTH:

2 Q. Okay. I'm going to hand you
3 what I'll mark as Exhibit 20, which is a
4 Form 8-K SEC filing from December 12th, 2001
5 by Alpharma, Inc.

6 Do you have --

7 A. I do. December 12th, 2001.
8 Yes.

9 Q. And I assume this is the kind
10 of document Mr. McCluer would have been
11 looking at to construct the genealogy of the
12 drugs?

13 MR. SOBOL: Objection, instruct
14 her not to answer.

15 MR. ROTH: On what basis?

16 MR. SOBOL: Because now you're
17 asking about the communications
18 between Mr. McCluer --

19 MR. ROTH: No, I'm asking what
20 Mr. McCluer looked at.

21 MR. SOBOL: Let me finish. Let
22 me finish.

23 MR. ROTH: All right.

24 MR. SOBOL: You're asking about
25 the communications between Mr. McCluer

1 and the lawyers.

2 MR. ROTH: I'm asking if this
3 is the kind of document Mr. McCluer
4 looked at to make the determination as
5 to whether Kadian should be attributed
6 to Actavis and to do the genealogy
7 work.

8 MR. SOBOL: Well, then I object
9 because that assumes a fact not in
10 evidence.

11 MR. ROTH: All right. Let me
12 reask the question so we get a clean Q
13 and A.

14 BY MR. ROTH:

15 Q. Is this the kind of document
16 Mr. McCluer would have looked at to
17 reconstruct the genealogy of the drugs in
18 your Table 3?

19 MR. SOBOL: Objection.

20 A. Well, first, I just want to be
21 clear that I've characterized what happened.
22 Mr. McCluer was absolutely involved because
23 he had these data and could bring them to
24 counsel.

25 So I was not suggesting that

1 Mr. McCluer was making a determination, so
2 I -- I understand that public documents were
3 a part of what Mr. McCluer had dug out. I
4 don't know what exactly was used to make the
5 determination.

6 BY MR. ROTH:

7 Q. You don't know whether
8 Mr. McCluer or counsel made the determination
9 or how it was made?

10 A. It was made with counsel. That
11 is what I know.

12 Q. Okay. So let's look at
13 Exhibit 20. So this is a 2001 8-K from
14 AlphaPharma, Inc.

15 Do you see that?

16 A. I do.

17 Q. And then at the bottom it says
18 Item 2, Acquisition or Disposition of Assets.

19 Do you see that?

20 A. Yes.

21 Q. On December 12th, 2001,
22 AlphaPharma, Inc. acquired through its wholly
23 owned subsidiary, Oral Pharmaceuticals
24 Acquisition Corp., all of the capital stock
25 of US Oral Pharmaceuticals Pty Limited, which

1 owns through subsidiaries the generic oral
2 solid dose pharmaceutical businesses of
3 FH Faulding & Company Limited (Faulding) from
4 Mayne Nickless Limited for \$660 million.

5 Do you see that?

6 A. Yes.

7 Q. And then in the next paragraph
8 down, it says Alpharma's acquisition of the
9 Oral Pharmaceuticals Business includes the
10 operations of Purepac Pharmaceuticals and
11 Faulding Laboratories in the United States.

12 Do you see that?

13 A. Yes.

14 Q. So going back to Exhibit 19,
15 for some reason or another, the decision was
16 made that Alpharma and Faulding were
17 non-defendants, but the other acquired
18 subsidiary, Purepac, is attributed to
19 Actavis.

20 A. I -- this is the first that
21 I've dug into a specific issue like this, so
22 I can't say as I'm sitting here that there's
23 some other piece of information that's
24 relevant. I really don't know.

25 Q. And you don't know whether

1 there are other issues like this with your
2 Table 3?

3 MR. SOBOL: Objection.

4 A. Again, I rely on counsel for
5 the identification of the appropriate
6 entities to be included in the defendant
7 group.

8 BY MR. ROTH:

9 Q. And if counsel was wrong in
10 allocating entities to defendant groups, then
11 your Table 3 would reflect that wrong input
12 from counsel in allocating causation to the
13 manufacturer defendants?

14 MR. SOBOL: Objection.

15 A. If there were a misallocation,
16 it could certainly be corrected and Table 3
17 rerun. Table 3 is just a product. It's a
18 simulation to show the capabilities. If
19 there's an underlying issue -- and again, I
20 don't know that there is one -- it could be
21 altered and changed.

22 (Whereupon, Deposition Exhibit
23 Rosenthal-21, Bloomberg Company
24 Overview of Purepac Pharmaceutical
25 Holdings Inc., was marked for

1 identification.)

2 BY MR. ROTH:

3 Q. Okay. Let me mark as
4 Exhibit 21 information from Bloomberg on
5 Purepac. Do you have that?

6 A. Yes, let's see.

7 Q. It says: Purepac
8 Pharmaceutical Holdings operates as a
9 subsidiary of Pfizer Inc.

10 A. Yes, I'm trying to figure out
11 what date. I see the date on -- this just
12 might be when it was printed, though, so
13 what's the date of this fact?

14 Q. This was printed off on
15 April 14th, 2019 from Bloomberg, so two weeks
16 old.

17 A. Right, right, I understand. I
18 just wasn't sure what time period you were
19 going to ask me be about since -- this may be
20 current, but I don't -- again, because things
21 change, I don't know.

22 Q. Well, that's a great point. So
23 what matters for Table 3? Are you looking at
24 current affiliation or past affiliation or
25 affiliation at the time of detailing? What

1 did Mr. McCluer do?

2 A. Again, on instructions from
3 counsel, as when a company acquires -- when a
4 defendant acquires a drug that was marketed
5 by another defendant earlier, those -- that
6 detailing carries forward to the acquiring --
7 the assumption there is that the acquiring
8 entity acquires liability for those effects.

9 Again, that's something that's
10 been explicit and so those kinds of changes
11 work that way.

12 Q. And that was an instruction
13 from counsel as opposed to an analysis of the
14 asset purchase agreement or some other
15 mechanism?

16 A. This was all on instruction
17 from counsel.

18 Q. Back to your tables for a
19 minute. If you look at Table C.6 -- I guess
20 one question: Do you know why C.5 and C.6
21 have privileged and confidential stamps at
22 the bottom?

23 A. I don't know. Not being a
24 lawyer, I think we might put it on
25 everything.

1 Q. Well, did counsel draft this on
2 their computer or was this something that
3 McCluer did?

4 A. This is something that we did.

5 Q. Okay.

6 MR. SOBOL: It might be because
7 of ARCOS.

8 BY MR. ROTH:

9 Q. So if you look at --

10 A. I love that you think counsel
11 know how to use a spreadsheet.

12 Q. I do actually. We'll have fun
13 if we get to trial.

14 A. Okay. Good.

15 Q. So if you look at Table C.6,
16 the first page starts with Actavis, and tell
17 me when you're there.

18 A. Yes.

19 Q. They're not numbered so it's a
20 little hard.

21 A. I know. Yes, I see Actavis.

22 Q. Just pivoting back to a
23 conversation we were having earlier. So, for
24 example, oxycodone, it looks like there's REDACTED
25 contacts that are attributed to Actavis.

1 Do you see that?

2 A. Yes.

3 Q. Which is zero percent of the
4 contacts because it's obviously lower than
5 one-hundredth of a decimal place of the
6 contacts?

7 A. Yes.

8 Q. And still there's [REDACTED]
9 MMEs that are associated with oxycodone.

10 Do you see that?

11 A. Yes. It's --

12 Q. Go ahead.

13 MR. SOBOL: There's no question
14 before you.

15 A. Yes.

16 BY MR. ROTH:

17 Q. Well, and then we can see like
18 in Kadian, you've got [REDACTED] contacts which
19 is [REDACTED], and that's associated with
20 [REDACTED] MMEs, right?

21 A. Yes.

22 Q. And you're not drawing any
23 conclusion about the effect of this extremely
24 small percentage of promotion and the number
25 of MMEs prescribed for those drugs, are you?

1 A. I think I've been extremely
2 clear that my analysis is an aggregate
3 analysis of the entire opioid class.

4 Q. So where it says [REDACTED]
5 MMEs for oxycodone, what is that number? Is
6 that all generic oxycodone from 1993 to 2018?

7 A. Sold by Actavis.

8 Q. Okay. So all oxycodone sold by
9 Actavis based on counsel and Mr. McCluer's
10 assignment of drugs is in the MME column, and
11 there's [REDACTED] promotional contacts in the data?

12 MR. SOBOL: Objection.

13 A. Well, again, instruction from
14 counsel identified the defendants. You can
15 see here that oxycodone is -- the
16 manufacturer is just Actavis. It seems
17 uncontroversial to me. But yes, there are
18 [REDACTED] MMEs of oxycodone that Actavis
19 sold between 1993 and 2018.

20 BY MR. ROTH:

21 Q. So can you tell without digging
22 into the guts of the model what share Actavis
23 is being allocated for its [REDACTED] oxycodone
24 contacts in your model?

25 MR. SOBOL: Objection.

1 Objection.

2 A. Well, you can see it rounded
3 here to two decimal places. The share of
4 contacts is obviously de minimis.

5 BY MR. ROTH:

6 Q. But in terms of the way the
7 shares work in your Table 3, are you looking
8 at percent contacts to come up with that
9 number? You're not; you're doing a revised
10 but-for analysis.

11 MR. SOBOL: Objection.

12 A. Yes, but the two things are not
13 disconnected. So the way I construct
14 Table 3, as I mentioned before, is not
15 allocating on the basis of MMEs. It's about
16 rerunning the but-for model and altering the
17 inputs in terms of detailing.

18 So the [REDACTED] contacts for Actavis
19 are backed out when I back Actavis out of the
20 model in Table 3, so that all of the contacts
21 that you see here associated with Actavis,
22 that is what gets backed out of the model.

23 BY MR. ROTH:

24 Q. So the [REDACTED] of promotional
25 contacts?

1 A. [REDACTED], yes.

2 Q. So how is that resulting in an
3 overall allocation in Table 3 of [REDACTED]?

4 MR. SOBOL: Objection.

5 A. [REDACTED] -- well, I'm sorry. I'm
6 afraid you misunderstand Table 3. So let me
7 go back and explain Table 3 again.

8 So Table 3 starts out with the
9 same aggregate impact measure that I
10 calculate in Table 2, right, so that's the --
11 if all defendant promotion did not occur,
12 here's what percent of units would not have
13 been sold.

14 And then in Table 3, then I
15 say, okay, well, what if, in fact, the [REDACTED]
16 of detailing that Actavis was responsible for
17 according to my analysis -- what if that's
18 actually -- that doesn't get affected. That
19 stays in the model. Then I run another
20 prediction. These are econometric
21 predictions based on Model B, and so the [REDACTED]
22 whatever percent, [REDACTED], now that's the
23 aggregate percent of all MMEs if Actavis'
24 conduct is no longer subject to recovery.

25 ///

1 BY MR. ROTH:

2 Q. So to figure out what
3 percentage of causation each manufacturer's
4 having, you actually have to subtract the
5 percentage that you come up with from that
6 analysis from the baseline?

7 MR. SOBOL: Objection,
8 mischaracterizes the testimony.

9 A. If you wanted to know how
10 much -- how many MMEs Actavis' conduct
11 specifically caused in the market overall,
12 you would subtract those two numbers.

13 BY MR. ROTH:

14 Q. So you would get [REDACTED], which is
15 close to the [REDACTED] of promotional contacts?

16 MR. SOBOL: Objection.

17 A. That's correct.

18 BY MR. ROTH:

19 Q. So essentially -- and we can do
20 this defendant by defendant, but it looks
21 like your allocations are just mirroring how
22 much each of these defendants promoted?

23 MR. SOBOL: Objection.

24 A. Well, they are not, but -- but
25 it should be obvious that because the

1 challenged conduct is promotion, that if we
2 look at taking defendants out of the impact
3 analysis, that the results would be
4 proportional to promotion, because that's the
5 thing that's being challenged.

6 BY MR. ROTH:

7 Q. So whoever has the most
8 detailing contacts in the IPS data is going
9 to get the highest share under your Table 3?

10 MR. SOBOL: Objection.

11 A. Well, again, Table 3 is not
12 framed or interpreted as telling you how to
13 allocate damages. It is intended for the
14 court to see, A, that it's possible to move
15 defendants in and out of the analysis, and,
16 B, what those effects would be.

17 Whether or not damages are
18 allocated on the same basis, that is
19 something about which I know nothing.

20 BY MR. ROTH:

21 Q. Okay. So we talked about
22 allocating the detailing contacts, and I
23 assume the questions I asked you about the
24 process for doing that would be true whether
25 we're talking about between defendants or

1 between defendants or non-defendants, it was
2 Mr. McCluer with instruction from counsel
3 reviewing the sort of documents we just
4 reviewed here today?

5 MR. SOBOL: Objection. What's
6 the question?

7 A. The --

8 MR. SOBOL: No, I don't know
9 what the question is. Is there a
10 question? Or you want to just say
11 "correct" at the end?

12 MR. ROTH: I mean, come on.
13 All right.

14 BY MR. ROTH:

15 Q. I asked you questions about how
16 detailing contacts were allocated. Is the
17 process you described the same whether we're
18 talking about allocating among the defendants
19 or between the defendants and non-defendants?

20 A. The process of identifying
21 what -- in effect, what contacts should be
22 assigned to defendants was with counsel, and
23 it was ultimately counsel's advice.
24 Mr. McCluer assisted because he had the
25 granular data, but ultimately, the

1 identification -- I mean, I'm not sure why
2 it's different to say the identification of
3 what pieces of -- what products belong with
4 what defendants and what products belong to
5 non-defendants. That's all one process.

6 Q. Okay. How does your model
7 allocate generic drugs?

8 MR. SOBOL: Objection.

9 BY MR. ROTH:

10 Q. The same way as we just
11 discussed?

12 MR. SOBOL: Objection.

13 A. I don't know what you mean by
14 allocate. My model measures the aggregate
15 impact of the challenged --

16 BY MR. ROTH:

17 Q. I should say it differently.
18 How does Table C identify and associate
19 generic drugs with manufacturers?

20 MR. SOBOL: Objection.

21 A. Table C, I mean, the process
22 for identifying the manufacturers and the
23 drugs is the same for generics as it is for
24 brand name drugs. Those generic
25 manufacturers are identified in the IPS --

1 sorry, in both the IPS and the NPA data.

2 BY MR. ROTH:

3 Q. And then looking back on
4 Exhibit 19, you reference that the marketers
5 were associated with entities pursuant to
6 marketing arrangements. What did you review
7 on that score?

8 A. I relied on counsel for that
9 information.

10 MR. ROTH: I tell you what, why
11 don't we take five more minutes,
12 because I think it would benefit for
13 streamlining.

14 THE WITNESS: Okay.

15 THE VIDEOGRAPHER: The time is
16 4:57 p.m. We're now off the record.

17 (Recess taken, 4:57 p.m. to
18 5:15 p.m.)

19 THE VIDEOGRAPHER: The time is
20 5:15 p.m. We're back on the record.

21 BY MR. ROTH:

22 Q. To close the loop on this,
23 Professor Rosenthal, Table 3 is the output of
24 Appendix C and the way that promotional
25 visits and MMEs are affiliated with the

1 defendants or non-defendants; is that right?

2 MR. SOBOL: Objection.

3 A. I guess I wouldn't say that
4 exactly. Table C reflects the underlying
5 data structure that allows us to parse
6 defendants individually and collectively from
7 non-defendants in the promotional data.

8 Table 3 then relies on that
9 structure to produce alternative but-for
10 percentages.

11 BY MR. ROTH:

12 Q. The purpose of putting Table C
13 together was to create Table 3?

14 MR. SOBOL: Objection.

15 A. I'm not sure that was its sole
16 purpose. It was to be transparent about how
17 we are allocating drugs and their associated
18 promotion to defendants.

19 BY MR. ROTH:

20 Q. Table 3 does not allow for a
21 defendant-specific breakdown of the effect of
22 that defendant's promotion, correct?

23 MR. SOBOL: Objection.

24 A. Table 3 provides an aggregate
25 measure of impact associated with defendants'

1 promotion; it does not disaggregate that
2 across sales.

3 BY MR. ROTH:

4 Q. And I think you said earlier,
5 for that you would have to do a disaggregated
6 model, and that's not something you were
7 asked to do, nor something you did?

8 MR. SOBOL: Objection, form,
9 mischaracterizes the prior testimony.

10 MR. ROTH: Okay. Let me try it
11 again.

12 BY MR. ROTH:

13 Q. In order to analyze the effect
14 of a specific defendant's promotion, you
15 would need to look at a defendant-specific
16 model to correlate its promotion to MMEs?

17 MR. SOBOL: Objection,
18 mischaracterizes prior testimony.

19 A. Well, I don't think so. What I
20 have done, as you know, in the aggregate is
21 to look at all promotion and the extent to
22 which it impacted all sales.

23 And then in Table 3, the only
24 thing I'm trying to do is to identify if we
25 moved some set of promotion from the okay

1 column -- from the not okay column back into
2 the okay column, how that would affect my
3 aggregate impact.

4 So I am looking discretely at
5 defendants' promotion. But because I'm
6 interested in impact, whether or not it was
7 increasing my sales or increasing your sales,
8 I have, appropriate to my assignment,
9 included both of those things in that impact
10 analysis. I have not been asked anywhere to
11 calculate the effect only on own sales.

12 BY MR. ROTH:

13 Q. Table 3 allows you to assess
14 the impact of an individual defendant's
15 promotional contacts on the aggregate
16 promotion and aggregate MMEs?

17 MR. SOBOL: Objection, asked
18 and answered.

19 A. Yes, that's correct. And just
20 to be clear, as we talked about before, the
21 purpose of Table 3 is not to allocate to
22 defendants. I don't know how damages
23 ultimately will be allocated, but to
24 demonstrate that I could remove the conduct
25 of one of the defendants and still calculate

1 aggregate impact.

2 BY MR. ROTH:

3 Q. And, in fact, Table 3 does not
4 even allow you to isolate the impact of an
5 individual defendant's promotion alone on the
6 aggregate; it simply shows you the proportion
7 of that individual defendant's promotion to
8 the aggregate?

9 MR. SOBOL: Objection, form,
10 asked and answered.

11 A. I don't think that's correct.
12 As we talked about before, this is not the
13 purpose of the table. But if you were to
14 look at the but-for percentage including
15 Purdue versus the but-for percentage
16 excluding Purdue, you would see the increment
17 that is due to Purdue's conduct.

18 BY MR. ROTH:

19 Q. And that's essentially based on
20 Purdue's share of the promotional contacts in
21 the data?

22 MR. SOBOL: Objection, asked
23 and answered.

24 A. That is the way the aggregate
25 model works, yes. It looks at all detailing

1 and their effect on all sales.

2 BY MR. ROTH:

3 Q. It's akin to a market share
4 analysis on the promotional data and the
5 number of contacts a given defendant has?

6 MR. SOBOL: Objection, form,
7 asked and answered.

8 A. Well, it's not strictly
9 speaking because the model has this time
10 series structure that marketing that occurs
11 at one point in time is not the same as
12 marketing that occurs at a different point in
13 time. So it's not, strictly speaking,
14 proportional.

15 BY MR. ROTH:

16 Q. But it is essentially a market
17 share analysis of each defendant's share of
18 contacts as modified by the time series
19 structure that you've imposed that we talked
20 about earlier today?

21 MR. SOBOL: Objection.

22 A. I just can't agree with that
23 statement. It's not a market share analysis.
24 It is the result, the output of a time series
25 analysis of the effect of marketing on sales,

1 and -- and then I alter a set of underlying
2 assumptions about what is in and what is out.

3 But it comes out of -- out of
4 this econometric model. It doesn't -- it's
5 not simply a market share analysis.

6 BY MR. ROTH:

7 Q. If you took all of the
8 defendants out of the model except for one,
9 what would the result of your table be?

10 MR. SOBOL: Objection.

11 A. Another number. I haven't done
12 that.

13 BY MR. ROTH:

14 Q. I mean, would that defendant
15 not just get the entire ■■■■, or would there
16 be some other...

17 A. No, that's not the way the
18 model works.

19 MR. SOBOL: Objection.

20 BY MR. ROTH:

21 Q. Okay. But it wouldn't be --
22 that would not be a defendant-specific model;
23 that would just be isolating how your
24 aggregate model works when you just consider
25 one defendant's promotion?

1 A. Well, again, the aggregate
2 model would be the same, and if we said that
3 all the defendants were no longer going to be
4 subject to recovery except one, then we would
5 be left with the -- whatever the effect of
6 that defendant's promotion on sales was.

7 Q. Have you compared the results
8 of altering your aggregate model using
9 Table 3 on a defendant-by-defendant basis
10 with each defendant's share of promotional
11 contacts in the data?

12 MR. SOBOL: Objection, asked
13 and answered.

14 A. Well, I think when you and I
15 were talking before the break, you made some
16 observation, but I have not, no.

17 BY MR. ROTH:

18 Q. Okay. When were you retained
19 by the plaintiffs in this case?

20 A. In the summer. I'm not sure
21 the date on the letter, but in the summer of
22 2018, sorry, to be clear.

23 Q. Who was it that retained you?

24 A. I was retained by co-counsel.
25 There are two Pauls and Joe Rice, and one of

1 them is a Hanly, but I can't remember all
2 their names.

3 Q. Okay. Did you personally draft
4 your expert report?

5 A. I did.

6 Q. And did anyone else assist you
7 in the drafting of the report?

8 A. I had some assistance from my
9 staff, yes.

10 Q. And you've mentioned your
11 staff. We said that was Greylock. Can you
12 just give us the names of all the people who
13 were on your staff?

14 A. Sure. Yes, of course. Forrest
15 McCluer, who is the senior economist they
16 mentioned earlier, particularly around the
17 technical aspects of the report. I believe I
18 would have had some assistance, for example,
19 in summarizing the complaint from Renee
20 Rushnawitz.

21 Q. Can you spell that?

22 A. Yes, R -- well, Renee, is
23 R-E-N-E-E, and then Rushnawitz,
24 R-U-S-H-N-A-W-I-T-Z.

25 Q. Okay. Anyone else?

1 A. Not that I know of, but there
2 are -- there are junior staff, for example,
3 who work with Forrest and Renee, so I think
4 if you looked, you might see that there were
5 junior staff pulling articles, doing that
6 kind of thing, but not involved in drafting.

7 Q. So I understand from earlier
8 today and attending their depositions that
9 there was some amount of coordination you did
10 with Professors Cutler, Gruber and McGuire
11 filing these reports; is that right?

12 A. Yes.

13 Q. Did you meet with each of the
14 three other professors about your reports in
15 person before March 25th?

16 A. Yes, we had meetings with
17 counsel.

18 Q. Do you recall how many meetings
19 you had with one or more of the Professor
20 Cutler group or McGuire try up frustrate
21 prior to March 25th with or without counsel
22 present?

23 A. I believe there were perhaps
24 four face-to-face meetings from the time I
25 was retained to the filing of the report. It

1 may have been five.

2 Q. And in addition to the four to
3 five face-to-face meetings, did you speak
4 with Professors Cutler, Gruber or McGuire
5 about either your work or their work on this
6 case?

7 A. We had conference calls with
8 that group and with counsel for a period that
9 were weekly.

10 Q. And do you recall how long the
11 in-person meetings were?

12 A. Those in-person meetings I
13 think were -- they were largely half day
14 meetings.

15 Q. And during those meetings, did
16 you present your analyses to each other on
17 slides or were they just conversations? How
18 did those meetings work?

19 MR. SOBOL: Just generally,
20 without the content.

21 A. Generally there were high-level
22 presentations and discussions.

23 BY MR. ROTH:

24 Q. And did you discuss with them
25 in general terms the analyses that ultimately

1 became the output of your expert report?

2 A. Yes.

3 Q. And the models you would run
4 and the approaches you would take?

5 A. Yes.

6 Q. And I assume they shared their
7 approaches and models and general report
8 structures with you too?

9 A. Yes.

10 Q. Did you review drafts of any of
11 their reports and did they review drafts of
12 your reports?

13 A. I -- what was the question.

14 MR. SOBOL: With or without
15 counsel?

16 A. Review drafts with or without
17 counsel?

18 MR. SOBOL: Well --

19 BY MR. ROTH:

20 Q. Were there drafts reviewed? I
21 know I'm not going to get the drafts. I just
22 want to know if you reviewed each other's
23 drafts?

24 MR. SOBOL: Sure.

25 MR. ROTH: And did the realtime

1 drop off?

2 DEFENSE COUNSEL: Ours is
3 working.

4 MR. ROTH: Never mind. Go
5 ahead.

6 A. So I did see drafts of at least
7 Cutler and part of McGuire.

8 BY MR. ROTH:

9 Q. And did you discuss the
10 regression model approaches that you would
11 each take with each other?

12 A. We discussed it, our analysis
13 in general, yes.

14 Q. Do you believe the regression
15 models you used in this case would be
16 publishable?

17 A. Yes, I do.

18 Q. What about Professor Cutler's
19 methodology? Do you believe that would be
20 publishable?

21 A. Yes, I do. It's very similar
22 to other work he has published.

23 Q. Do you believe that professor
24 Gruber's methodologies would be publishable?

25 A. Yes, obviously professor

1 Gruber's methodology -- it's multiple
2 methodologies it's not one thing, but yes, I
3 believe it would be.

4 Q. And same question for professor
5 McGuire?

6 A. Yes, I believe it would be.

7 Q. I noticed you're charging \$825
8 an hour for your time?

9 A. Yes, that's correct.

10 Q. How many hours have you spent
11 to data personally working on this matter?

12 A. I believe the number is about
13 300.

14 Q. And what about your team at
15 Greylock McKinnon? Do you have any sense to
16 as how many hours they've spent?

17 A. I have not looked at their
18 hours.

19 Q. I imagine it's been more or
20 less a full-time job for them since July?

21 A. I think that that is pretty
22 close to true.

23 Q. And have you or Greylock issued
24 any invoices?

25 A. Greylock submits those

1 invoices. I don't know for sure. I assume
2 that they have submitted invoices.

3 Q. Do you have any sense as to the
4 overall quantum of how much you have Greylock
5 have charged in fees?

6 A. No, I do not.

7 Q. And I assume your work is not
8 contingency fee based in any way?

9 A. It is not in any way.

10 Q. Did the plaintiffs replace any
11 reconstructions on cost or the scope of work
12 that you or Greylock was allowed to do?

13 A. Not to my knowledge, nothing --
14 nothing in my retention that suggested that,
15 no.

16 Q. Okay. So we spoke earlier
17 today about a couple of things you're relying
18 on counsel for. One was the assumption that
19 they'll prove all marketing since 1995 is
20 unlawful, correct?

21 A. Yes.

22 Q. Another one the construction of
23 table C that allocated promotional contacts
24 from the IPS data to defendants, right?

25 MR. SOBOL: Objection.

1 A. Right, to the extent there's
2 uncertain city there, it's not just the way
3 the data arrive, so yes, that genealogy.

4 BY MR. ROTH:

5 Q. Right. So we've got those two
6 things. As sit here right now, is there any
7 other assumption that was given to you by
8 counsel that we haven't talked about yet?

9 A. Hmm.

10 MR. SOBOL: On the direct or --
11 I can't think of anything, but you
12 haven't really --

13 MR. ROTH: We haven't gone past
14 the direct model yet, that's true.

15 A. Yeah, it's helpful for me to
16 see my summary.

17 BY MR. ROTH:

18 Q. Okay.

19 MR. SOBOL: She was given the
20 assignment. I'm not trying to coach
21 her.

22 A. Not that I can think of, as I
23 sit here.

24 BY MR. ROTH:

25 Q. Okay. Look at Attachment A

1 with me, please, for a minute. And that's
2 the CV that you filed with your report in
3 this case?

4 A. Yes.

5 Q. And I assume that is still
6 accurate as of today?

7 A. It's the most updated one I
8 have. It may -- what is it May there may
9 have been a paper or two that's been
10 published since the CV was finalized.

11 Q. Okay. Have you published any
12 economic papers related to opioids?

13 A. I have not.

14 Q. Have you published any academic
15 papers related to addiction?

16 A. I have not.

17 Q. And you've never testified
18 previously on either opioids or addiction,
19 true?

20 A. I believe that that is true.

21 I'm just trying to think of cases that
22 involved multiple drugs, but I --

23 Oh, yes, although actually I
24 have to check to see if it's -- if I actually
25 testified in this case. I just want to look

1 at that part of my CV. Let's see. Or I
2 could look at the report --

3 Q. Yeah. Take your time.

4 A. -- testimony. Yeah, one sec.

5 (Document review.)

6 A. This case was a number of years
7 ago, and I just honestly cannot remember if I
8 was ever deposed in it, so I can confirm that
9 offline, but there was another ways that I
10 was retained in that related to an opioid.

11 BY MR. ROTH:

12 Q. I tell you what, we can start
13 there tomorrow.

14 A. Okay.

15 Q. Have you ever had your opinions
16 excluded or limited by a court?

17 A. In one case an opinion I
18 offered on ascertainability in a case
19 involving a drug called Wellbutrin XL, my
20 opinion on -- on damages was accepted, by my
21 opinion as it related to ascertainability was
22 deemed to have included some inappropriate
23 legal assumptions, as I understand the
24 judge's opinion in that matter. So yes.

25 Q. And is that the only one were a

1 court limited or excluded your opinions?

2 A. Yes.

3 Q. You're not aware of any others
4 as you sit here right now?

5 A. I'm not aware of any others.

6 Q. What happened in Celexa and
7 Lexapro?

8 MR. SOBOL: Objection to form.

9 A. Again I'm not a lawyer, but I
10 don't think my opinion was excluded.

11 BY MR. ROTH:

12 Q. Okay. Is Attachment B to your
13 report a complete list of all of the
14 materials on which you relies to form your
15 opinions in this case?

16 A. It is.

17 Q. Did you review any materials
18 that you didn't rely on that aren't included
19 in Attachment B?

20 A. I may have. It would be hard
21 for me to cross-walk to see things that I
22 reviewed and didn't rely on. My staff
23 certainly reviewed other documents.

24 Q. How were the depositions that
25 you reviewed -- I think there are seven in

1 total -- selected?

2 A. Yes. I specifically asked
3 counsel -- because as you know in my
4 assignment I was asked to undertake this
5 analysis nationally, I specifically asked
6 counsel to find in their record any testimony
7 relative to the national nature of marketing.
8 It's not something that's easy to find in
9 documents, otherwise.

10 Q. Got it.

11 So you received those seven
12 with -- in response to your very specific
13 requests?

14 A. Yes.

15 Q. And beyond that, you didn't
16 review any depositions in this case?

17 A. I don't believe I cite
18 depositions for any other purpose in this
19 case, no.

20 Q. You list three other expert
21 reports, Schumacher, Perri and Parran.

22 Do you see that?

23 A. I do.

24 Q. Are those the only expert
25 reports that you reviewed before issuing

1 yourself. I think you mentioned you might
2 have seen drafts of Cutler, McGuire and
3 Gruber?

4 A. Yes, but I don't cite to them
5 my report or use them.

6 Q. Yeah, count rely on them?

7 A. No.

8 Q. How did you select the Bates
9 numbered documents that are listed in
10 Attachment B?

11 A. The Bates number documents were
12 the product of searches that I asked my staff
13 to undertake specifically looking for
14 information on marketing tactics.

15 One big set of documents that I
16 asked them to find was related to promotional
17 effectiveness, and those documents that talk
18 about the return on investment for marketing
19 expenditures.

20 So these were basically the
21 result of specific requests I made to my
22 staff and they searched the database
23 themselves.

24 Q. And did you review all of the
25 documents related on in your Attachment B, or

1 did you rely on your staff to do some of that
2 review for you?

3 A. I reviewed the key segments of
4 all of these documents. Some of the
5 documents are quite long, and I relied on my
6 staff to review the whole documents.

7 Q. I'd be shocked if you read
8 every one of these in 300 hours?

9 A. Yes, as I said, some of these
10 documents are very long, and you see that I
11 cite to specific parts of them.

12 Q. Okay. Look at B8 please which
13 lists the electronic data you relied on.

14 A. Okay.

15 Q. So we've talked a lot today
16 about the NPA and the NSP data from IQVIA?

17 A. Yes.

18 Q. Sorry.

19 A. The IPS --

20 Q. And the NPA and the IPS data.

21 A. Yes.

22 Q. But have we not talked about
23 the NSP data. So what is the National Sales
24 Perspective data and how you are relying on
25 that?

1 A. I'm trying to think if we
2 actually use the NSP. I know we cite it in
3 our tables. We show it in Table C in order
4 to be able to show wholesale quantities as
5 well. But we actually use the NPA data
6 themselves, you know, essentially they track
7 the same -- the same products at different
8 stages of the supply chain and so I can't
9 recall.

10 I'd have to actual look
11 carefully through the tables to see if
12 there's any reason that we used the wholesale
13 data. Those are wholesale data.

14 Q. So the NPA data is the retail
15 data.

16 A. That's correct.

17 Q. And the NSP data is the
18 wholesale data?

19 A. Correct.

20 Q. Do you know if you did any data
21 cross-walking or review of the two data
22 sources to see how they related to each
23 other?

24 A. I believe we may have. I don't
25 know -- I don't know if there's -- that's

1 what I was trying to remember, if there's
2 anything in my report to that effect. We
3 have used those two datasets very frequently,
4 and they typically are extremely highly
5 correlated. One lags the other, obviously.

6 MR. SOBOL: Do you mind if I
7 coach him on an irrelevancy right now?
8 No seriously, this might just help you
9 to clean something up.

10 Do you use NSP for prices?

11 THE WITNESS: No, I use the NPA
12 for prices.

13 MR. SOBOL: Okay.

14 MR. ROTH: Okay.

15 BY MR. ROTH:

16 Q. So on the electronic data
17 section, what is this agency for healthcare
18 research quality healthcare cost and
19 utilization project and how do you use that?

20 A. Sure. That's part of our
21 conversation for tomorrow, I hope. Those
22 data are discharge data that we use to look
23 at the surgical admissions.

24 Q. In the indirect model?

25 A. Yeah, in Section X.

1 Q. And then the bureau of labor
2 statistics that's also used in the indirect
3 model?

4 A. Yes.

5 Q. The ARCOS data is in the
6 indirect model. What is this health
7 resources services administration Area Health
8 Resource File?

9 A. The Area Health Resource File
10 is sort of a metadata file. It includes data
11 from other sources to describe various
12 dimensions of county-level health systems,
13 health measures. So we also used that in the
14 indirect model, and I actually have to look
15 to see if we used in the Section X.

16 Q. And then what about the CDC
17 surveillance epidemiology and end result
18 dataset?

19 A. Those data track cancer, cancer
20 epidemiology.

21 Q. How did you get access to the
22 electronic data that you list in
23 Attachment B?

24 A. Attachment B includes some
25 publicly available data that anyone can

1 obtain through the Internet, so that would
2 cover the ARC data, the ASEC data, the SEER
3 results, because we're not getting the SEER
4 microdata; they're aggregated. And certainly
5 the morphine milligram equivalence from the
6 CDC is publicly available data, the Area
7 Health Resource File is publicly available
8 data.

9 The ARCOS data we obtained
10 through compass lexicon, the IQVIA data
11 counsel purchased on our behalf. They won't
12 sell it to us directly for litigation
13 purposes. They will sell to counsel.

14 Q. And the --

15 A. And the INCB are public.

16 Q. And did you discuss with
17 counsel purchasing any additional IQVIA data
18 than the three set that you analyzed, IPS,
19 NPA or NSP?

20 MR. SOBOL: I instruct her not
21 to answer.

22 MR. ROTH: I asked her if she
23 talked about it.

24 MR. SOBOL: Well, it would
25 carry the implication of the content

1 of the conversation.

2 BY MR. ROTH:

3 Q. Are you aware that you've sells
4 data beyond those three datasets that were
5 purchased?

6 A. Yes. I am aware they sell
7 other datasets.

8 Q. Okay. Did you sign any
9 protective orders to get access to the ARCOS
10 data?

11 A. I did not, no.

12 Q. And have you signed any data
13 use agreements related to any of the data you
14 looked at?

15 A. No, but I don't know to what
16 extent, for example, the people who actually
17 have the data have signed those data use
18 agreements so I don't touch the data.

19 Q. I didn't see any depositions
20 from any of the Cuyahoga or Summit County
21 witnesses on Attachment B, so I assume you
22 didn't review those?

23 A. I did not.

24 Q. Did you interview any of the
25 employees with other Summit or Cuyahoga

1 County?

2 A. My analysis is a national
3 analysis of the effect of detailing on sales,
4 so interviewing people in the bellwether
5 counties would if the really not make sense
6 as part of what I'm trying to do.

7 Q. And you didn't rely beyond the
8 seven depositions you list any other
9 depositions in this case related to
10 defendants' marketing efforts?

11 A. Again, I -- I don't find those
12 to be relevant to the main affect the here,
13 which is a quantitative analysis, and as I
14 noted in my report, economists generally
15 proceed using data to tell what people have
16 done in response to a stimulus rather than by
17 asking them to talk about it.

18 Q. What did you do to prepare for
19 your deposition today?

20 A. I reviewed my report, the
21 documents I rely on, including the articles,
22 basically everything in this Attachment B,
23 and I had conversations with counsel.

24 Q. Okay. Turning back to page 10
25 of your report, which is the handy summary

1 chart?

2 A. Yes.

3 Q. Do you do this for every
4 report?

5 A. I -- it's -- I like a handy
6 summary table. It's something that is --
7 that we do often in writing federal grants.

8 Q. I will tell you this is
9 excellent and I'm going to start forcing some
10 of the experts that we have to start doing
11 this?

12 MR. SOBOL: It's the only thing
13 I understand in the whole report.

14 MR. ROTH: It's nice, it's a
15 one-pager.

16 BY MR. ROTH:

17 Q. So recognizing there's a lot of
18 nuance here, and we've already been through
19 your direct model fairly exhaustively and
20 we'll do the same for the indirect and the
21 Section X analysis tomorrow?

22 A. Yes.

23 Q. I want to touch briefly on
24 Section VII for a minute?

25 A. Okay.

1 Q. Okay. So Section VII, you
2 reviewed literature on the marketing of
3 opioids and shared examples from discovery
4 that corroborate the economic theory and
5 evidence on pharmaceutical marketing. That's
6 what you said, right?

7 A. Yes.

8 Q. And we've talked about some of
9 that literature here today?

10 A. We have. We haven't gone into
11 detail on the transfers of value literature
12 related to opioids, but we can.

13 Q. It's a tomorrow topic, unless
14 you want to stay late?

15 A. No, that's fine.

16 Q. But then on the discovery
17 materials, you know, you said you had very
18 specific requests for what you looked at.

19 Are those the documents you
20 looked at to come to the conclusions you do
21 in Section VII of your report?

22 A. Yes. The documents that I cite
23 in Section VII -- and again can you tell that
24 my quantification of the effect of promotion
25 on sales doesn't rely on some measure from

1 this analysis, but this serves to give some
2 justification for the theory that I'm
3 pursuing that promotion affects sales and
4 that there are multiple mechanisms involved.

5 So I review them, I would say
6 in Section VII with that purpose in mind, not
7 with the purpose of being exhaustive.

8 Q. Yeah. And I think you said
9 earlier you're not marketing expert, right?

10 MR. SOBOL: Objection.

11 A. I am not here to offer an
12 expert opinion on marketing. I think
13 Dr. Perri does that.

14 BY MR. ROTH:

15 Q. Okay. And to the extent that
16 you're offering comments in Section VII.B of
17 your report from paragraphs 43 to 48 related
18 to defendants' marketing documents, that's
19 really did you know with an eye toward
20 corroborating what the economic literature
21 shows in -- as you analyze in Section VI
22 about the relationship between promotion and
23 sales?

24 A. Again, this was not intended to
25 be an exhaustive analysis, but to show that

1 the documents provide examples both of the
2 economic idea that promotion is intended to
3 grow sales and of the multiple marketing
4 mechanisms that defendants use, so it
5 corroborates other -- other ways that I have
6 described the mechanism of interest here.

7 Q. Beyond reading the documents
8 themselves, what other analytical approach
9 did you take to assessing defendants'
10 materials regarding the effects of promotion?

11 A. Well, as I just said, I don't
12 use this analysis as an input in a
13 quantitative way to my subsequent analysis.
14 It is relate intended as you would see in any
15 economic paper as a review of the
16 institutional landscape that justifies the
17 particular model and sets up the empirical
18 analysis in a more qualitative way.

19 Q. It's not really a separate
20 opinion as you bulleted it out. It's more
21 context for the opinions that follow; is that
22 fair?

23 MR. SOBOL: Objection.

24 A. Again, I think an institutional
25 analysis is a part of most -- most reports

1 that I have done looking at impact is
2 describing the environment in the way they
3 describe the broader environment for
4 prescription drugs in the U.S., I think it's
5 important to set that context.

6 BY MR. ROTH:

7 Q. But when you're talking about
8 describing the environment, you're limiting
9 yourself to, you know, a subset of documents
10 that you received from discovery. You're not
11 doing any exhaustive review of each defendant
12 east marketing budgets; is that correct?

13 A. That is correct. That is not
14 any assignment. It's not -- my goal here was
15 not to do an exhaustive analysis of what each
16 defendant was doing. Doing.

17 Q. In fact, there may be some
18 defendants you don't look at any documents
19 for in Section VII.B?

20 MR. SOBOL: Objection.

21 A. Again, I'm not sure, it was not
22 intended to be exhaustive.

23 BY MR. ROTH:

24 Q. Okay. What is confirmation
25 bias?

1 A. Confirmation bias is a
2 psychological phenomenon, in essence that you
3 find what you expect to find.

4 Q. And does that exist in
5 economics?

6 A. It's a known psychological
7 bias. I imagine that economists are humans
8 too.

9 MR. ROTH: Okay. Why don't we
10 pause on that, take --

11 THE WITNESS: You're going to
12 end the day there?

13 MR. ROTH: I might. So let's
14 stop. Give us five to caucus, and
15 that might be a really nice place to
16 end the day.

17 THE VIDEOGRAPHER: The time is
18 5:48 p.m. We're off the record.

19 (Proceedings recessed at
20 5:48 p.m.)

21 --oOo--

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CERTIFICATE

I, MICHAEL E. MILLER, Fellow of the Academy of Professional Reporters, Registered Diplomate Reporter, Certified Realtime Reporter, Certified Court Reporter and Notary Public, do hereby certify that prior to the commencement of the examination, MEREDITH B. ROSENTHAL, Ph.D. was duly sworn by me to testify to the truth, the whole truth and nothing but the truth.

I DO FURTHER CERTIFY that the foregoing is a verbatim transcript of the testimony as taken stenographically by and before me at the time, place and on the date hereinbefore set forth, to the best of my ability.

I DO FURTHER CERTIFY that pursuant to FRCP Rule 30, signature of the witness was not requested by the witness or other party before the conclusion of the deposition.

I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney nor counsel of any of the parties to this action, and that I am neither a relative nor employee of such attorney or counsel, and that I am not financially interested in the action.



MICHAEL E. MILLER, FAPR, RDR, CRR
Fellow of the Academy of Professional Reporters
NCRA Registered Diplomate Reporter
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Certified Court Reporter

Notary Public

My Commission Expires: 7/9/2020

Dated: May 6, 2019

1 INSTRUCTIONS TO WITNESS

2
3 Please read your deposition over
4 carefully and make any necessary corrections.
5 You should state the reason in the
6 appropriate space on the errata sheet for any
7 corrections that are made.

8 After doing so, please sign the
9 errata sheet and date it.

10 You are signing same subject to
11 the changes you have noted on the errata
12 sheet, which will be attached to your
13 deposition.

14 It is imperative that you return
15 the original errata sheet to the deposing
16 attorney within thirty (30) days of receipt
17 of the deposition transcript by you. If you
18 fail to do so, the deposition transcript may
19 be deemed to be accurate and may be used in
20 court.

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ACKNOWLEDGMENT OF DEPONENT

I, MEREDITH B. ROSENTHAL, Ph.D.,
do hereby certify that I have read the
foregoing pages and that the same is a
correct transcription of the answers given by
me to the questions therein propounded,
except for the corrections or changes in form
or substance, if any, noted in the attached
Errata Sheet.

MEREDITH B. ROSENTHAL, Ph.D.

DATE

Subscribed and sworn to before me this
_____ day of _____, 20 ____.

My commission expires: _____

Notary Public

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